TP 3821

M.V. ARCTIC
MASTER DATA PACKAGE
1979 - 1980 - 1981
SEASONS

Prepared by

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Montreal

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17 Abstract

A data acquisition system was installed on the MV ARCTIC to record the ship's operational experience while navigating in ice in terms of prevailing environmental conditions, performance and response. The system was operated on Arctic Voyages from 1979 to 1981 during which period numerous data tapes were recorded.

In addition, four (4) dedicated ice trials were conducted i) Saguenay River, ii) Baffin Island, iii) Lake Melville and iv) Admiralty Inlet where specialized teams monitored significant parameters of the ship's icebreaking process in various types of ice. Tests were designed to encompass all aspects of ice breaking. All data is stored on magnetic tape for analysis ashore.

This document contains a summary of the recorded information plus auxiliary information obtained from contractor's reports and handwritten logs during the three year period. It has been presented in a manner that allows the analyst, at a glance to ascertain the nature of information contained in each tape/file thereby precluding the necessity of a preliminary analysis for each file. The format chosen is easily readable and provides quick access to the information.

A brief description of the data acquisition system is given in the appendices to provide a better understanding of the data recording process for those unfamiliar with the system.

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7 Résumé

Un système de saisie de données a été installé à bord de l'Arctic afin de rendre compte du comportement de ce navire lorsqu'il navigue dans des eaux chargées de glaces, de sa manoeuvrabilité et sa tenue face aux diverses conditions extérieures. Ce système a été mis en marche durant les périples effectués par l'Arctic entre 1979 et 1981 et les données correspondantes ont été enregistrées sur un grand nombre de rubans.

En outre, une série de quatre essais spécialisés ont eu lieu: i) dans le Saguenay, ii) aux environs de l'île Baffin, iii) dans le lac Melville et iv) dans le goulet de l'Amirauté, où des équipes de spécialistes ont enregistré les paramètres les plus importants concernant l'aptitude du navire à fracturer des glaces de divers types. Des essais ont été faits pour prendre en compte tous les aspects de ce processus, les données correspondantes étant stockées sur rubans magnétiques pour fins d'analyse ultérieure.

Le présent rapport récapitule l'information recueillie ainsi que celle tirée des rapports du contractant et des carnets de bord durant ladite période de trois ans. Présenté sous forme de tableau synoptique, il renseigne sur le contenu de chaque ruban et dispense du besoin d'avoir à en faire une analyse préliminaire. Le format choisi permet une lecture aisée ainsi qu'un accès rapide à l'information stockée.

Le rapport est complété d'annexes qui donnent une description succincte du système de saisie utilisé afin de renseigner utilement ceux qui l'emploient pour la première fois.

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1.0 GENERAL INFORMATION

1.0 GENERAL INFORMATION

1.1 INTRODUCTION

The design of a new generation of icebreaking cargo vessels capable of commercial operation in the Arctic entails certain technical and economic uncertainties. With a view to assisting in the design of a new generation of merchant ships for northern operations, a data acquisition system was installed aboard the M.V. ARCTIC; a forerunner of this type of ship. The system is designed to record the ship's operational experience while navigating in ice in terms of prevailing conditions, the ship's performance and response. All data is stored on magnetic tape for subsequent analysis ashore.

The system was operational during three Arctic Voyage Seasons (1979 to 1981) creating a large data base of information related to the navigation of ships in ice. Data was also recorded on four Dedicated Ice Trials conducted at different times of the year during which more detailed information of the ship's manoeuvring and ice conditions was obtained. A description of the system and its capabilities is included in an Appendix.

The next phase in this program is the analysis of the data recorded. This will entail a detailed reduction of the recorded tapes, processing and interpretation of the results. The general direction will be towards a better understanding of the processes involved in the icebreaking mechanism of the M.V. ARCTIC thereby aiding the design of similar ships for commercial navigation in the Arctic.

The operation of the Data Acquisition System over the past seasons has been performed by four major contractors to Transportation Development Centre. In the process, numerous reports have been generated on various aspects of the system such as maintenance, operation, and analysis. Therefore, there is a large volume of information in these documents that an analyst attempting an examination in this field of study must first be acquainted with before he/she can carry out further investigation.

1.1 INTRODUCTION (Cont'd)

In order to aid the analyst perform this function, all relevant information relating to the analysis of the recorded data has now been compiled in the Master Data Package. The presentation of the document enables the analyst to ascertain, at a glance, the nature of information contained in each tape file. Thus, the Master Data Package provides quick access to the information while precluding the requirement for a preliminary analysis of each tape file and unnecessary duplication of effort.

1.2 OBJECTIVES OF THE PROGRAM

In general, the objective of the program for the design of the M.V. ARCTIC Data Acquisition System is to further Arctic Marine Technology with respect to all aspects of ship operations in ice.

Specifically, the objectives are the following:

1. To evaluate the structural strength standards and other design criteria assumed to be necessary in the Arctic Shipping Pollution Prevention Regulations, for a vessel of Class II, and to offer a quantitative and qualitative appraisal of these standards for other classes of icebreaker cargo vessels envisaged by these Regulations.

2. To evaluate the restraints on seasonal operation periods and zones currently established in the regulations for a vessel of Arctic Class II.

3. To establish a correlation between the performance of the tank tested model of the vessel in ice with actual vessel under Arctic operational conditions, and to establish its icebreaking efficiency under actual and diverse operational conditions of weather and ice intensity.

1.2 OBJECTIVES OF THE PROGRAM (Cont'd)

4. To establish the degree of effectiveness, in the continuous icebreaking mode, of special features incorporated into the initial design of the proposed vessel such as an air bubbler system to reduce the frictional effects of broken ice and a ducted propeller feature.

5. To provide an instructional base upon which the expertise of ice navigation and commercial ship operation in Arctic waters may be further developed and dispensed.

The objectives are discussed in detail below:

OBJECTIVE NO. 1:

Evaluation of Arctic Shipping Pollution Prevention Regulations with regard to structural and other design criteria.

i) The boundaries and extent of the six principal areas of exposure to ice as set forth in Schedule 'F' of the Regulations.

ii) The minimum thickness permitted of shell plating in the ice exposure areas as calculated under Schedule 'F' of the Regulations and the validity of the ice pressures assigned in Table 2 of Schedule 'F' and the ice loadings assigned in Table 3 of Schedule 'F' and the section moduli for main transverse and longitudinal frames as calculated under Schedule 'F' of the Regulations.

iii) The rudder, rudder post, rudder stock, pintles and steering gear scantlings as determined under Schedule 'F', and the adequacy of the stipulated minimum power of the steering gear indicated in Paragraph 11, Sub-Paragraph 4, of Schedule 'F'.

1.2 OBJECTIVES OF THE PROGRAM (Cont'd)

OBJECTIVE NO. 1: (Cont'd)

iv) The rudder side plating as indicated in Paragraph 11, Sub-Paragraph 7 of Schedule 'F'.

v) The power requirements of Schedule 'G', both ahead and astern mode of operation.

vi) The ice torque factor of Paragraph 3 of Schedule 'G'.

vii) The propeller blade scantlings of Paragraph 5 of Schedule 'G'.

viii) The screw shaft diameter of Paragraph 6 of Schedule 'G'.

ix) The torque values applied to the gearbox stipulated in Schedule 'G', Paragraph 8.

Objective No. 1 is of practical importance to amendment of the Arctic Shipping Pollution Prevention Regulations should amendments prove to be advisable, or equally important results if the criteria are proven to be suitable for a Class II Ship.

To enable an assessment of the correctness of the Arctic Shipping Pollution Prevention Regulations criteria, it is essential to determine the probability of exceeding safe stresses in the structures from ice pressure or impact (items i to iv, vi to ix) and the general adequacy, or inadequacy, of the minimum power levels established in Schedule 'G'. An indication that normal safe stress and strength levels may occasionally be exceeded is not in itself sufficient information to warrant amending the Regulations without supplementary data on the maximum stresses which can occur, the frequency and the time (season) and Arctic zones.

1.2 OBJECTIVES OF THE PROGRAM (Cont'd)

OBJECTIVE NO. 1: (Cont'd)

The impact of multi-year fragments and bergy bits upon hull and appendage structures and shafting system result in structural overstresses. This is more probable with vessels of large Δ/ρ ratio and large Δ. Small ships of high power, low Δ/ρ and low Δ may be safe from dynamic effects and more able in any case to manoeuvre for avoidance of such contacts when travelling at cruising or reduced speeds. The larger ship with high Δ/ρ are not able to avoid impacts as easily and moreover such impacts may be more severe owing to their greater inertia (momentum). It is therefore relevant to this program to determine the frequency of heavy impacts, their severity, and geographic regions of occurrence in order to access both the structural adequacy and determine if other criteria should be introduced into the Arctic Shipping Pollution Prevention Regulations (such as a code for safe speed related to ship displacement, and power, ice class, Arctic zone and season).

Since dynamic structural events of importance are likely to be infrequent, but important nonetheless, the structure was also monitored at times when the ship was underway in Arctic zones in which there was any risk of collisions with significant ice fragments taking place. Furthermore, since the events are purely random, it cannot be foretold in which part of the ship's forebody (or afterbody if she is manoeuvring) the event will take place. Additionally, such events are likely to be random events of very low frequency and consequently a single significant event may have never occurred on a given small instrumented structural panel in the test period. Indeed, a significant event of this nature may be confined to one or two per season, yet occur sufficiently often to be classified as a regional hazard than a freak occurrence, with implications for amendment of the Arctic Shipping Pollution Prevention Regulations.

OBJECTIVE NO. 2:

To record environmental conditions and seasonable constraints.

1.2 OBJECTIVES OF THE PROGRAM (Cont'd)

OBJECTIVE NO. 2: (Cont'd)

The objective is reached by continuous recording of the following environmental information:

- Date
- Vessel position, Vessel course, Vessel speed
- Daylight hours
- Visibility
- Wind Velocity
- Wind Direction
- Air Temperature
- Description of ice cover
  - % cover
  - % floes 0-100m, over 500m
  - Composition of ice cover
    - % first year ice and thickness of fragments
    - % second year ice and thickness of fragments
    - % multi-year ice and thickness of fragments
  - In field ice of solid cover, evidence of ridging or pressure
  - Frequency and heights of ridges, if present
  - Presence of growlers and frequency
  - Presence of bergy bits and frequency
  - Presence of icebergs and frequency
- Precipitation: rain, hail, sleet, snow
- Relative Humidity
- Evidence of icing and description of effects
- Seastate

Seasonal constraints are identified and recorded. These are found in the above general collection of data, such as heavy ice formations, daylight hours, iceberg and growler hazard, and icing conditions.

1.2 OBJECTIVES OF THE PROGRAM (Cont'd)

OBJECTIVE NO. 3:

To establish correlation between model and prototype behavior, especially for icebreaking.

Correlation can be established where all relevant conditions are quantifiable in the prototype regime and reproducible in the model regime.

However, for valid comparisons to be made with model test results, the full scale performance must be measured in fully instrumented conditions of special tests which involve environmental conditions which can be reliably modelled.

To date no reliable method has been developed to quantitatively describe pack ice conditions with sufficient exactness to model, and model test techniques have not been developed to date for modelling such ice even if it could be described. The factors which have so far eluded successful modelling of pack ice include:

a) The fragment makeup of the pack
b) The thickness
c) The "friction factor"
d) The pressure

Ice floes may conceivably be described and modelled but the technique for modelling partial cover conditions comprising random floes has not been developed either.

The following ice trials conducted are useful for the purpose of establishing correlation between model and prototypes.

a) Continuous mode, resistance tests, at various power levels in uniform fast sheet ice of various thicknesses at various strength levels and various snow cover conditions.

1.2 OBJECTIVES OF THE PROGRAM (Cont'd)

OBJECTIVE NO. 3: (Cont'd)

b) Ramming mode resistance tests in various power levels, thicknesses, strength and snow cover conditions.

c) Ridge penetration tests. For correlation it may not be sufficient to assume one of the several ridge "models" now available. The reproducibility of an actual ridge in the model regime is open to question. In any case, ridge penetration tests in prototype regime will yield valuable data for design purposes and for checking theoretical approaches even if modelling and correlation should not prove feasible.

d) Resistance tests in rafted ice. If suitable rafted ice conditions can be found.

e) Extraction tests.

f) Turning circle and coursekeeping tests.

OBJECTIVE NO. 4:

To ascertain the efficiency of auxiliary icebreaking systems.

The auxiliary icebreaking system on this vessel is the air bubbler system

To meet this objective, measured tests mentioned under OBJECTIVE NO. 3 are done with and without the bubbler system operating when possible. In addition, the vessel is started from dead stop position in ice with and without the bubbler system operating and the time and the final steady state speed of the ship in the ice cover noted. Different ice thicknesses, snow cover, etc., are included. Such data has value in design

1.2 OBJECTIVES OF THE PROGRAM (Cont'd)

OBJECTIVE NO. 4: (Cont'd)

of future bubbler installations. By testing under various conditions, the effect of ice thickness on bubbler system effectiveness is determined, as is its performance in different types of ice conditions (sheet ice, pack ice, heavy snow cover, etc.)

OBJECTIVE NO. 5:

To provide an instructional base for improving expertise in Arctic operations.

It is anticipated that the following aspects of Arctic operations will receive enlightenment from the tests conducted:

a) Appropriate speeds for operations in waters containing significant ice fragments such as growlers, bergy bits, etc..

b) Appropriate speeds for proceeding through various types of pack ice conditions (assuming the vessel is capable of such speeds).

c) Appropriate speeds for proceeding through various configurations of partly open water containing ice floes of various thicknesses and extent.

d) Appropriate speeds for ramming solid ice sheet.

e) Steering performance in different ice conditions and thickness.

f) Icing probability and ice accretion hazard by region and seasons.

1.2 OBJECTIVES OF THE PROGRAM (Cont'd)

OBJECTIVE NO. 5: (Cont'd)

g) Icing probability as a function of temperature and relative humidity.

h) Possibility of "tacking" through ice fields under pressure.

i) The effect of wind pressure on pack ice fields.

j) Some indication of the hazard on a monthly basis, e.g. the probability of striking growlers and bergy bits in regions in which these exist.

1.3 OBJECTIVES OF THE ANALYSIS OF DATA

The previous section described the objectives of the program for the design of the Data Acquisition System.

These original objectives must be borne in mind by the analyst and related to the following current areas of investigation for the analysis of the data:

1. Ice transitting performance
2. Manoeuvring performance
3. Ship motion performance
4. Propulsion performance
5. Structural performance
6. Instrumentation performance

2.0 ARCTIC VOYAGE SEASONS

2.0 ARCTIC VOYAGE SEASONS

2.1 VOYAGE MONITORING RECORDS

The voyage monitoring records contain information on the tapes recorded during commercial voyages of the M.V. ARCTIC, during the Arctic season (June-November) when the ship navigates in Arctic waters. Information on each season comprises the following:

A) VOYAGE LOG

A voyage log for each recording season indicates originating and destination ports for each voyage, the number of tapes and files recorded, their index numbers, and recording and navigating time in ice.

B) VOYAGE MAP

The course navigated by the M.V. ARCTIC for each voyage, with an indication of the location at which the tapes were recorded.

C) VOYAGE RECORDS

The voyage records are a summary of the raw data recorded manually and on tape during Arctic voyages. Each tape file is summarized on one voyage record sheet and consists of the following items:

*File index no:	Year-Voyage # - Contractor Tape # . File #
*Date:	Date Recorded
	Times Recorded
	Elapsed Time

*Contractor that conducted the test for TDC and corresponding TP number of the final report.

*Geographical location where recorded, with latitude and longitude.

C) VOYAGE RECORDS (Cont'd)

*Operating conditions of ship, including forward and aft draught, whether ballasted or carrying cargo, and if the bubbler system was in use.

*Environmental conditions not recorded by the system giving the range of parameters recorded such as ice thickness and cover giving specific values for first year and older ice, snow cover, flexural and compressive strength, friction, pressure, ridges, crystal and salinity.

*Transit mode of the ship for that tape file (continuous, ramming, astern, or turning) and the type of channel (broken, old, new and open water) presented in matrix form. Also type of icebreaker support provided, if any.

*Rationale for recording data giving reason/s for recording the tape and reason/s for choice of the sampling pattern.

*Recording notes indicate whether in recording or standby mode, if file has header and/or EOF, and the channels used in the sampling pattern to be omitted in carrying out the analysis.

*Video recording information gives the video tape number (year -tape no.) and the recording times.

*Photos information gives the number of photographs taken pertaining to the recording of that file and their numbers (film no. frame no.).

*Comments provide additional information relevant to the recording of that file and not included in the above categories.

2.0 ARCTIC VOYAGE SEASONS (Cont'd)

2.1 VOYAGE MONITORING RECORDS (Cont'd)

C) VOYAGE RECORDS (Cont'd)

*Statistical printout for that file including the recording rates and modes, alarm limits, maximum/minimum values recorded, the mean, rms, and standard deviations.

Information on the sampling pattern used for each file and the corresponding status of the sensors at that time is contained in Appendix 'A'. In cases where non-operational sensors were included in the sampling patterns, this has been noted in the comments under 'omit channels'.

2.2 ARCTIC RECORDING SEASON - 1979

2.2 ARCTIC RECORDING SEASON - 1979

1979 was the first year that the Data Acquisition System was operated to record the performance of the M.V. ARCTIC. German & Milne Inc. were contractors to TDC during that year for both the operation and maintenance of the System.

The season lasted from 16th July 1979 to 16th November 1979 during which the M.V. ARCTIC made three round trips to Nanisivik NWT and one to Churchill, Manitoba. A total of 39 tapes were recorded on these trips.

Ice conditions in this season were severe, particularly on the first voyage to and from Nanisivik.

A collision with the M.V. STONE near Antwerp on 15th August required a week (15th - 19th September) in the shipyard. A subsequent engine cylinder explosion on 23rd September 1982 required an unscheduled call at St. John's, Newfoundland for repairs in early October.

The sampling pattern for the 1979 Arctic season was initially chosen randomly from among the sensors considered to be operational at the time. The sampling rate was selected at the system maximum.

Strain gauges were randomly selected at rates 3 and 4 to give a general indication of stresses induced in all sections of the hull. As a sampling rate of Rate 3 (10 samples per second) is not sufficiently fast to detect impacts of short duration, all gauges at rate 3 are sampled in the peak mode while only those at rate 4 (40 samples per second) are recorded in the real mode.

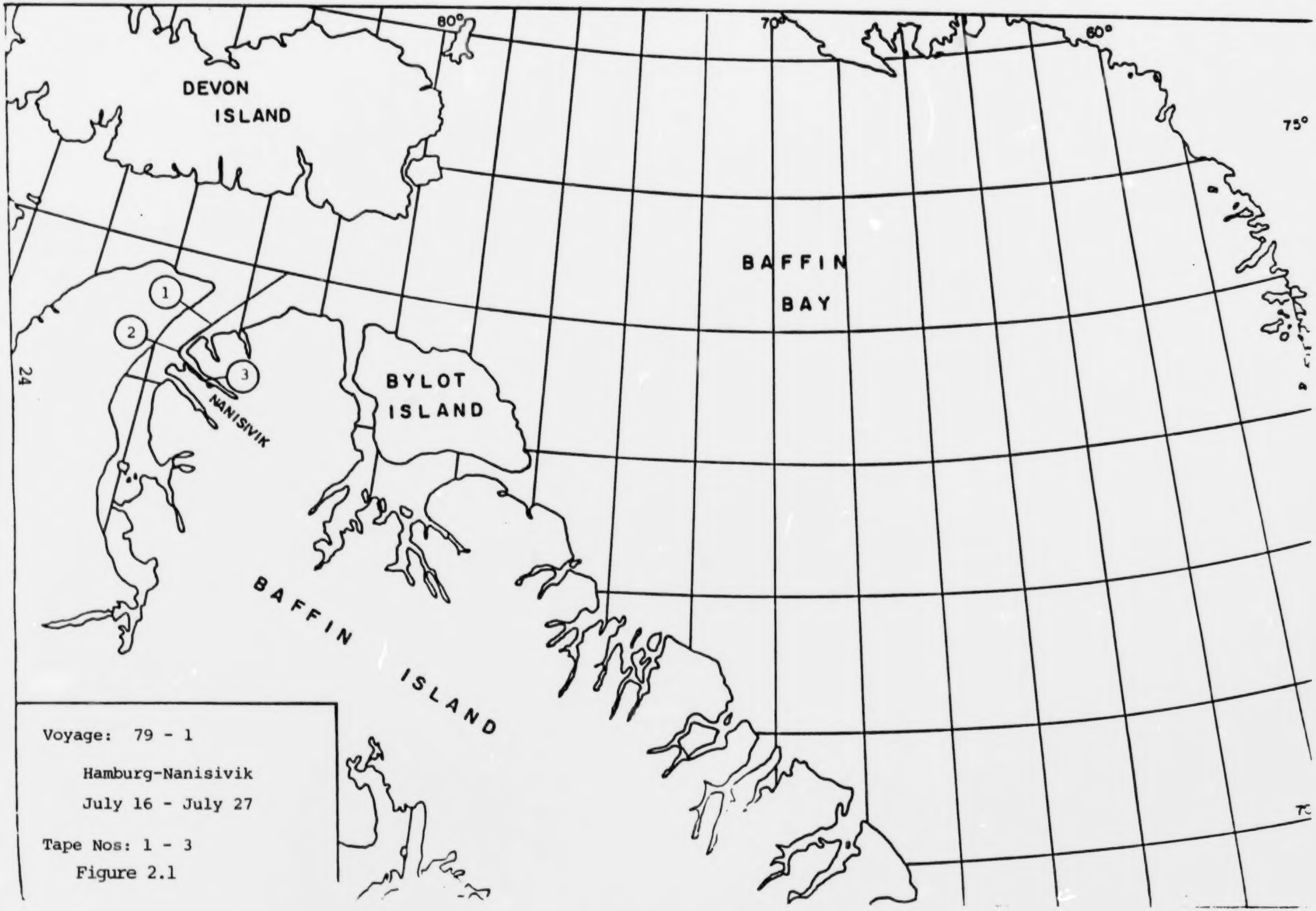
SAMPLING RATES
EFFECTIVE PRIOR TO OCTOBER 22, 1980

R - Real
P - Peak

Rate 0	-	Sensor not sampled
Rate 1	-	1 sample/10 seconds
Rate 2	-	1 sample/second
Rate 3	-	10 samples/second
Rate 4	-	40 samples/second
Rate 5	-	100 samples/second
Rate 6	-	250 samples/second
Rate 7	-	1000 samples/second

VOYAGE LOG
Arctic Season 1979

Voyage No.	Origin - Destination (Dates)	Tape Numbers (number of files)	Video Tape No.	Dates in Ice (total time)	Recording Time (hr:min:sec)	
					in ice	total
79-1	Hamburg - Nanisivik (16 July - 27 July)	1(1), 2(2), 3(2)	VT1	- 27 July 0300 (80:00 hrs partial)	02:06:12	02:16:12
79-2	Nanisivik - Antwerp (29 July - 10 Aug.)	4(8), 5(1), 6(1)	VT2	29 July 1630 - 29 July 2340 (7:10 hrs)	01:32:00	02:17:21
79-3	Antwerp - Nanisivik (12 Aug - 22 Aug)	7(1), 8(4), 9(1), 10(1) 11(1), 12(1), 13(2) 14(2), 15(1)	-	20 Aug 1940 - 22 Aug 1500 (43:20 hrs)	11:58:37	13:03:46
79-4	Nanisivik - Antwerp (24 Aug - 4 Sept)	16(1), 17(1), 18(1), 19(1), 20(2)	VT2	24 Aug 1400 - 24 Aug 2110 (7:10 hrs)	03:27:55	10:21:02
79-5	Antwerp - St. John's - Nanisivik (19 Sept - 5 Oct - 15 Oct)	21(1), 22(1), 23(1), 24(1), 25(1)	-	14 Oct 1315 - 14 Oct 2050 (7:35 hrs)	02:24:33	04:05:09
79-6	Nanisivik - Antwerp (17 Oct 79 - 29 Oct 79)	26(1), 27(1), 28(1) 29(1), 30(1)	-	17 Oct 0300 - 17 Oct 1130 (8:30 hrs)	04:24:30	04:24:30
79-7	Antwerp - Churchill (1 Nov - 16 Nov)	31(1), 32(1), 33(1), 34(1), 35(2) 36(1) 37(2), 38(1), 39(1)	-	13 Nov 0545 - 13 Nov 2300 (17:15 hrs)	04:49:55	06:26:20
			TOTAL (hrs:mins:secs)	**171:00:00**	**30:43:42**	**42:54:20**


DEVON ISLAND
BAFFIN BAY
BYLOT ISLAND
BAFFIN ISLAND
NANISIVIK
80°
70°
60°
75°
70
1
2
3

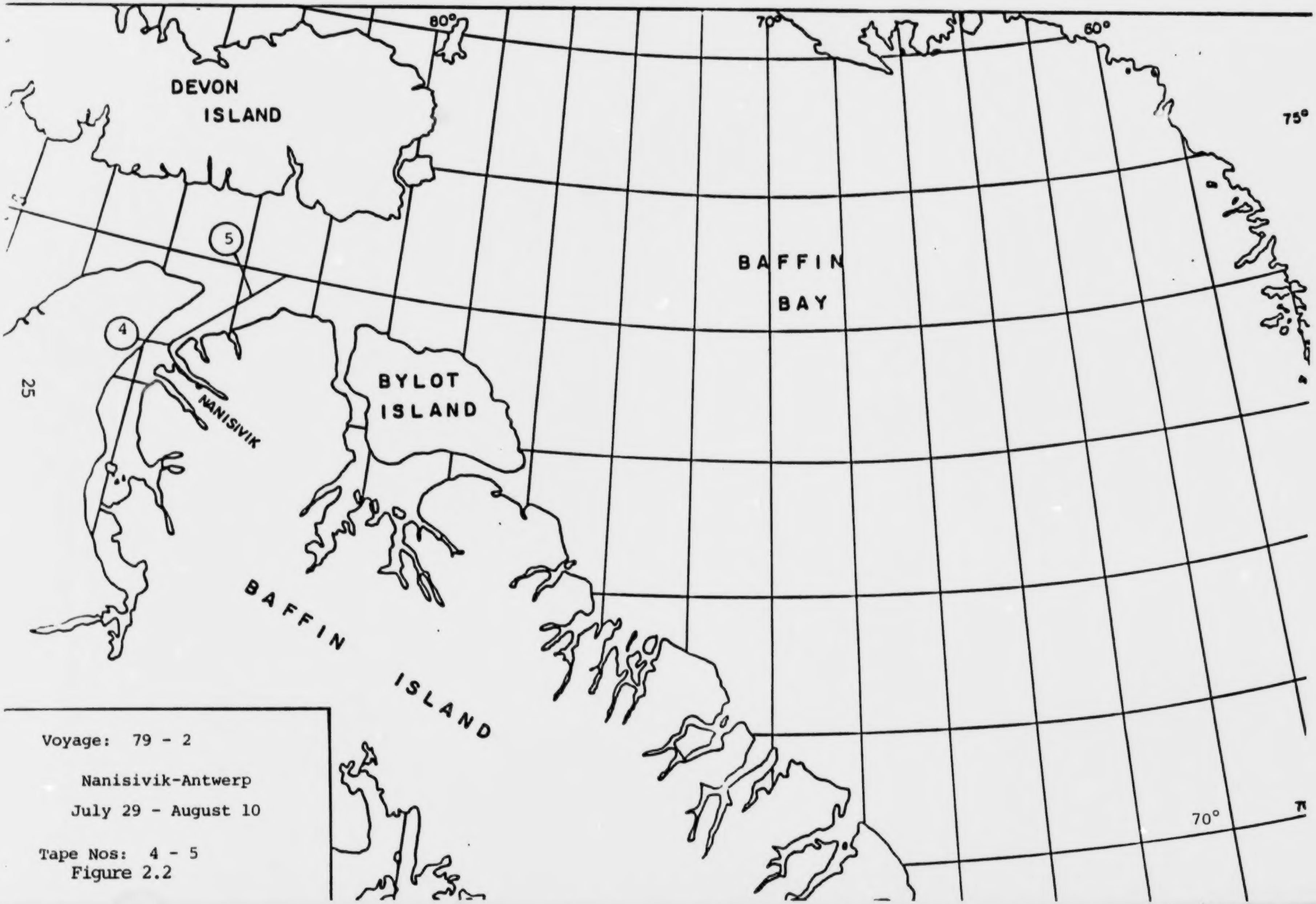
Voyage: 79 - 1

Hamburg-Nanisivik

July 16 - July 27

Tape Nos: 1 - 3

Figure 2.1

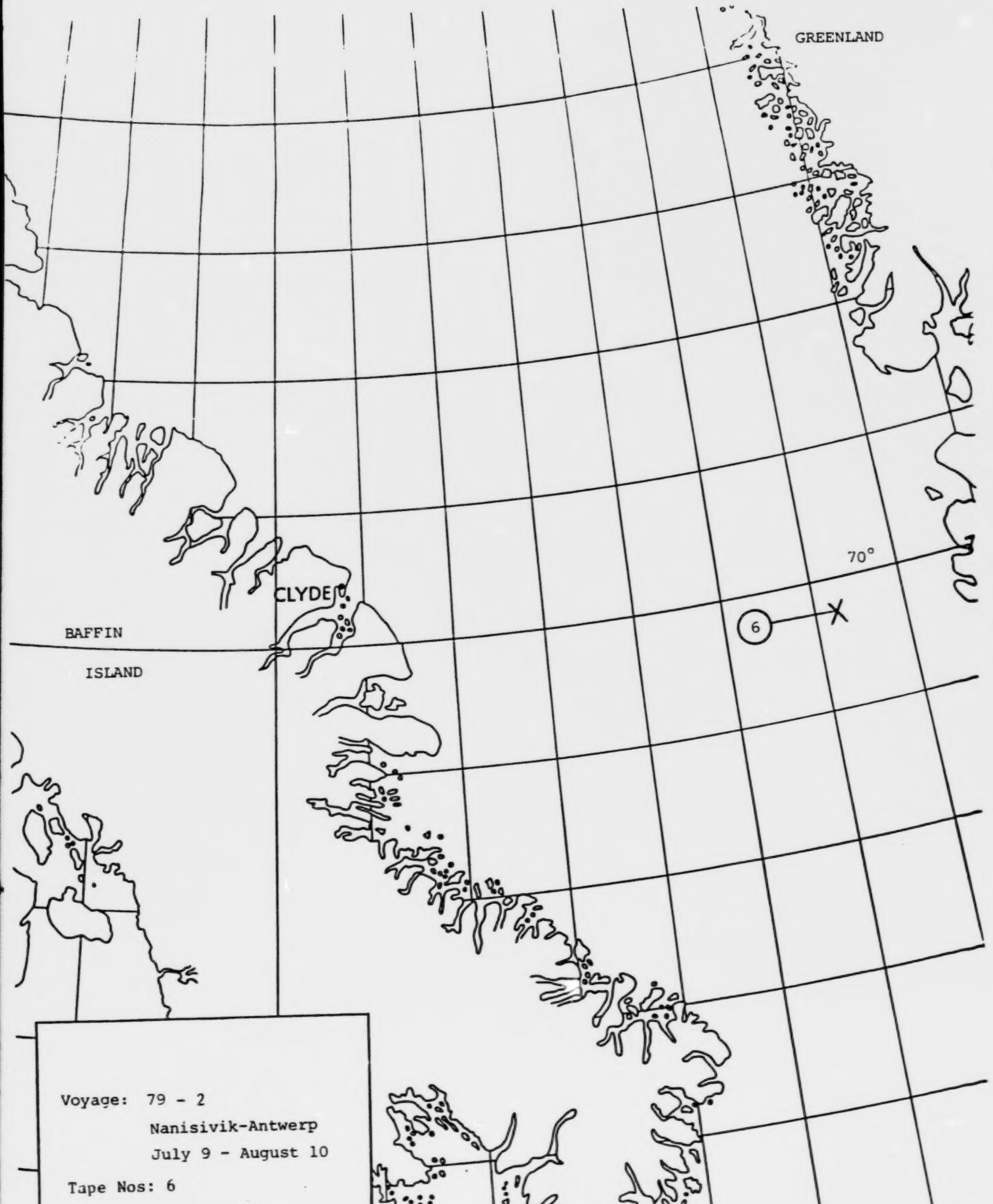

DEVON ISLAND
BYLOT ISLAND
BAFFIN BAY
BAFFIN ISLAND
NANISIVIK
4
5
80°
70°
60°
75°
70°

Voyage: 79 - 2

Nanisivik-Antwerp

July 29 - August 10

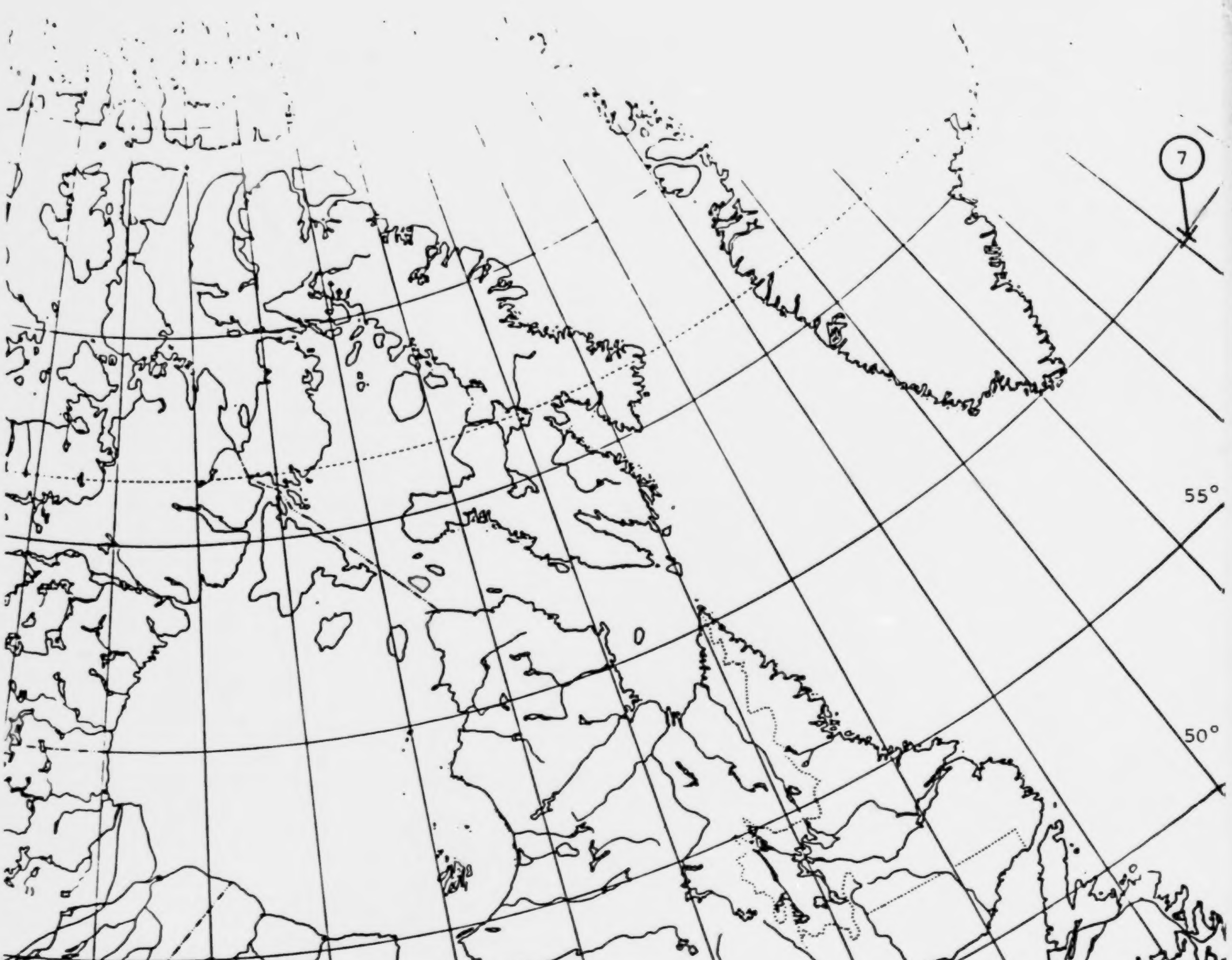
Tape Nos: 4 - 5
Figure 2.2


GREENLAND
BAFFIN
ISLAND
CLYDE
70°
6
70°
60°
65

Voyage: 79 - 2
Nanisivik-Antwerp
July 9 - August 10

Tape Nos: 6

Figure 2.3


7
55°
50°
45°
40°
95°
90°
85°
80°
75°
70°
65°

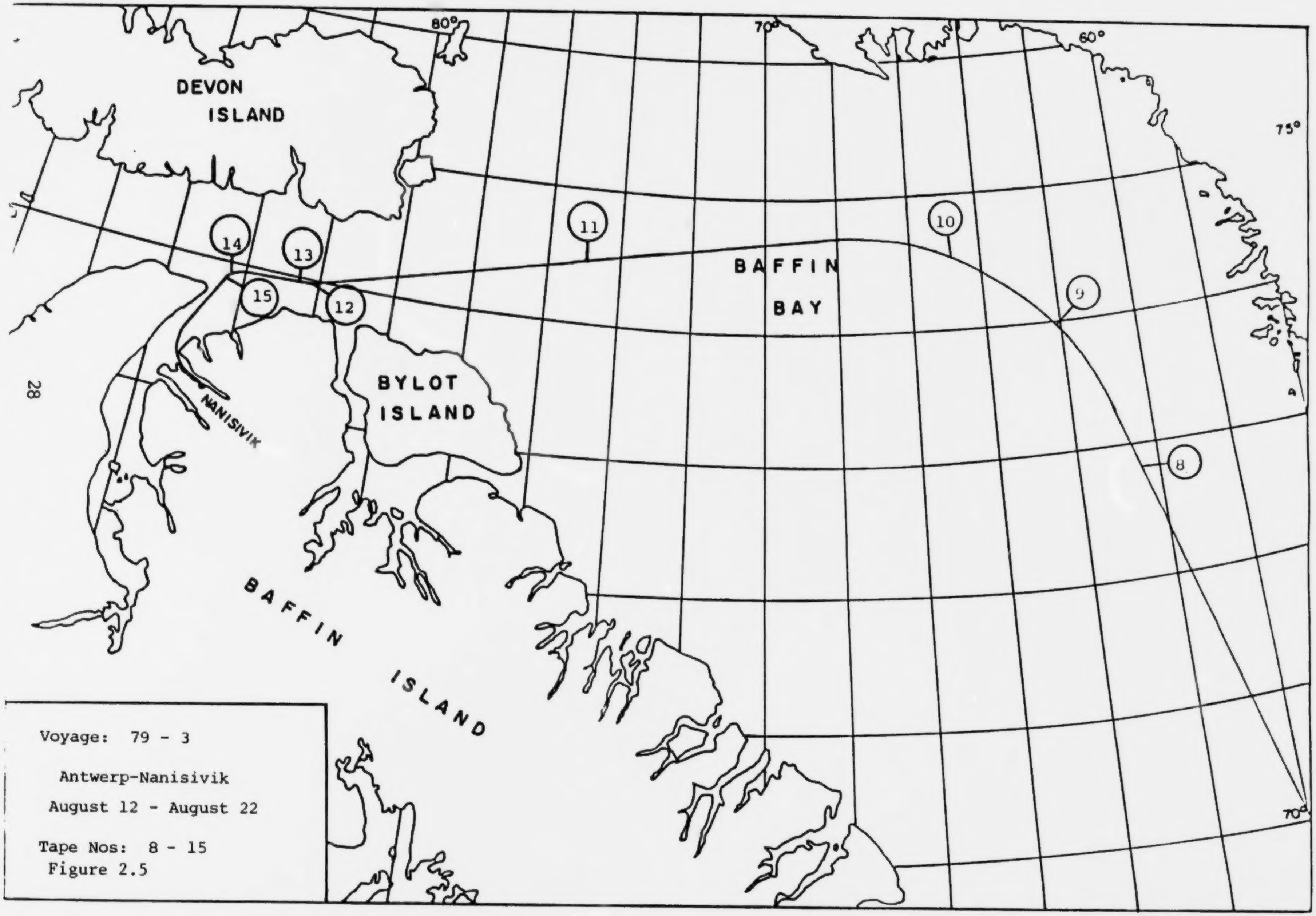
VOYAGE: 79 - 3

Antwerp-Nanisivik

August 12 - August 22

Tape Nos: 7

Figure 2.4



80°
70°
60°
75°
70°
DEVON ISLAND
BYLOT ISLAND
BAFFIN BAY
BAFFIN ISLAND
NANISIVIK
8
9
10
11
12
13
14
15

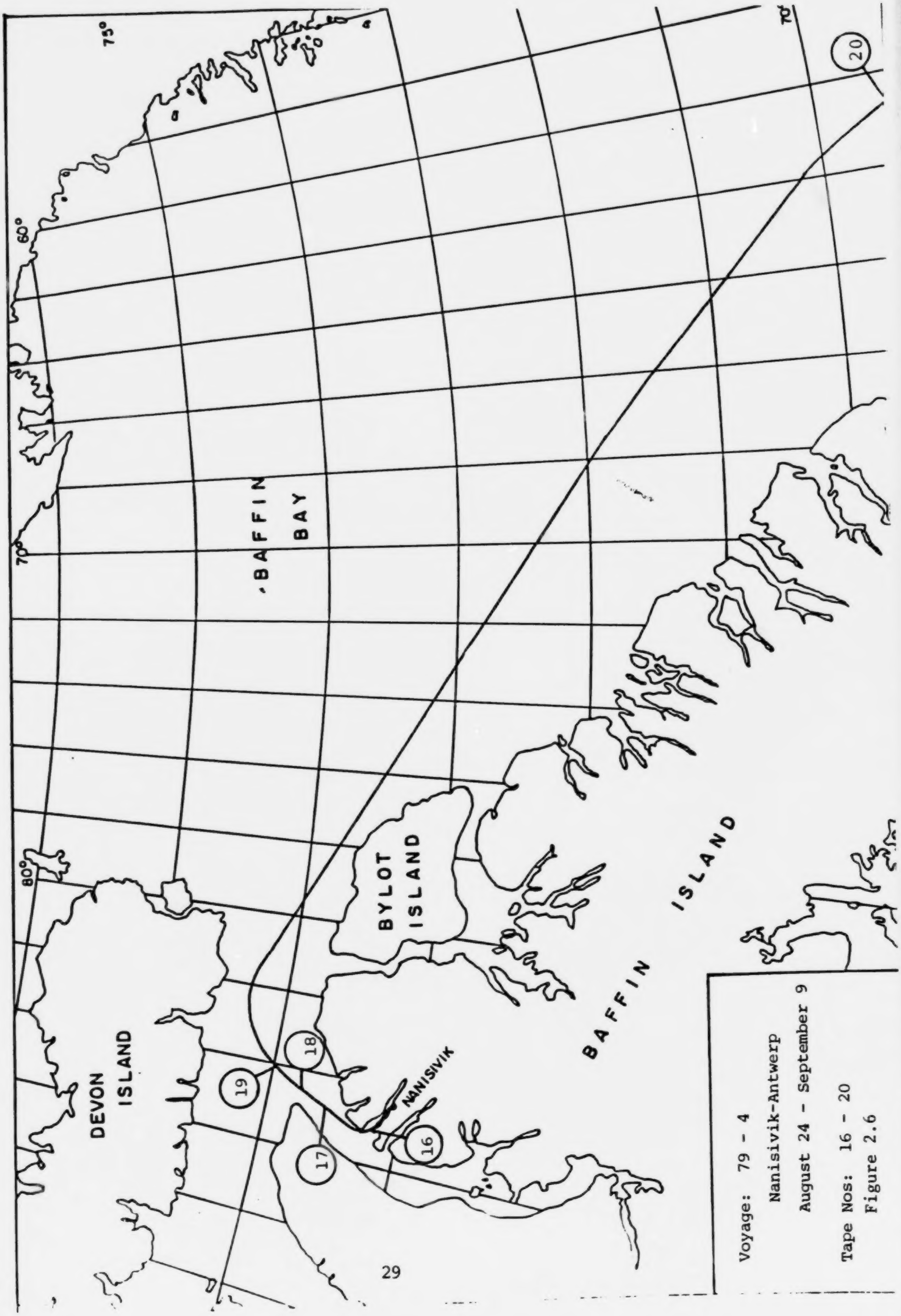
Voyage: 79 - 3

Antwerp-Nanisivik

August 12 - August 22

Tape Nos: 8 - 15

Figure 2.5


75°
60°
70°
80°
70°
BAFFIN BAY
DEVON ISLAND
BYLOT ISLAND
BAFFIN ISLAND
NANISIVIK
16
17
18
19
20

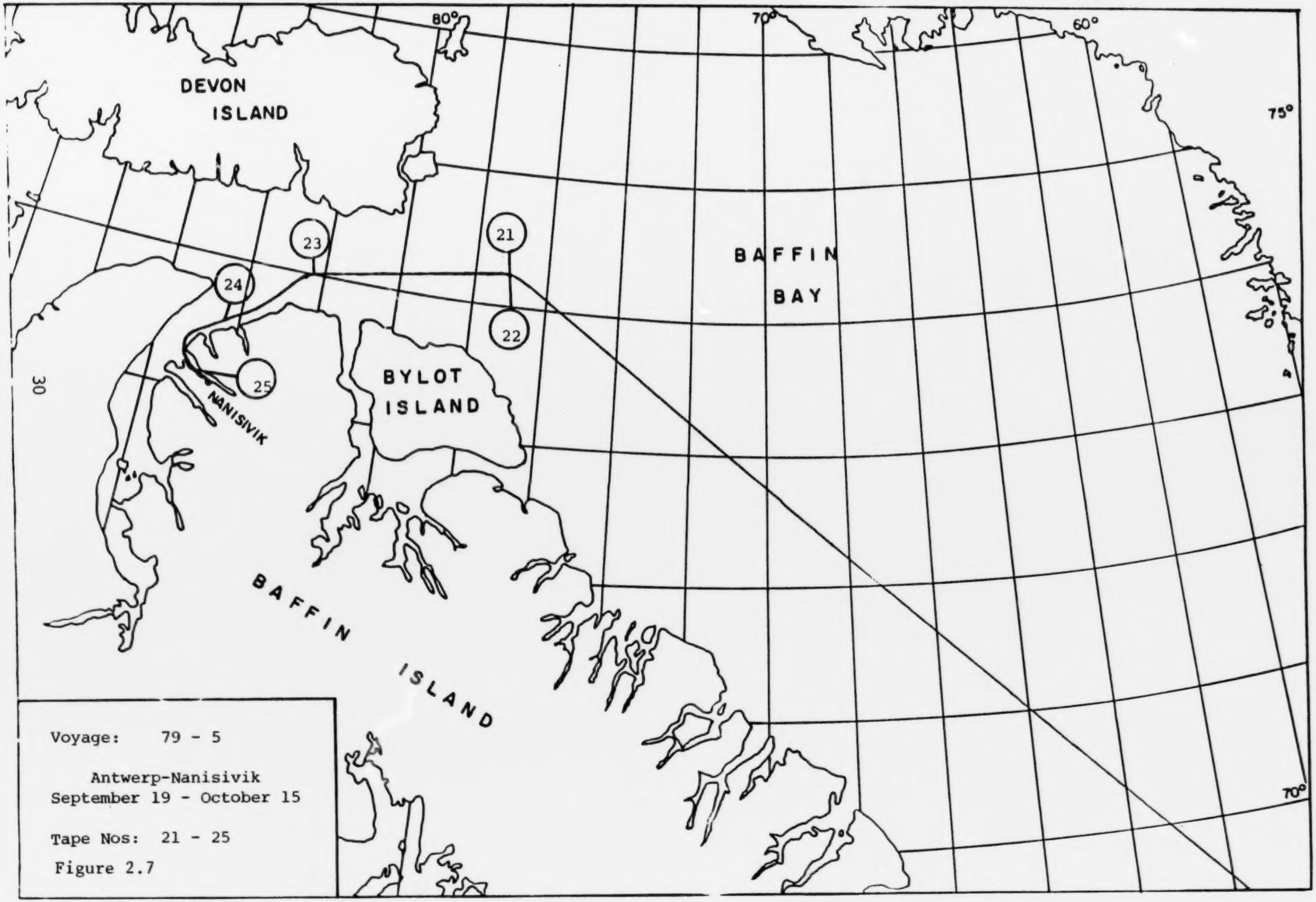
Voyage: 79 - 4

Nanisivik-Antwerp

August 24 - September 9

Tape Nos: 16 - 20

Figure 2.6

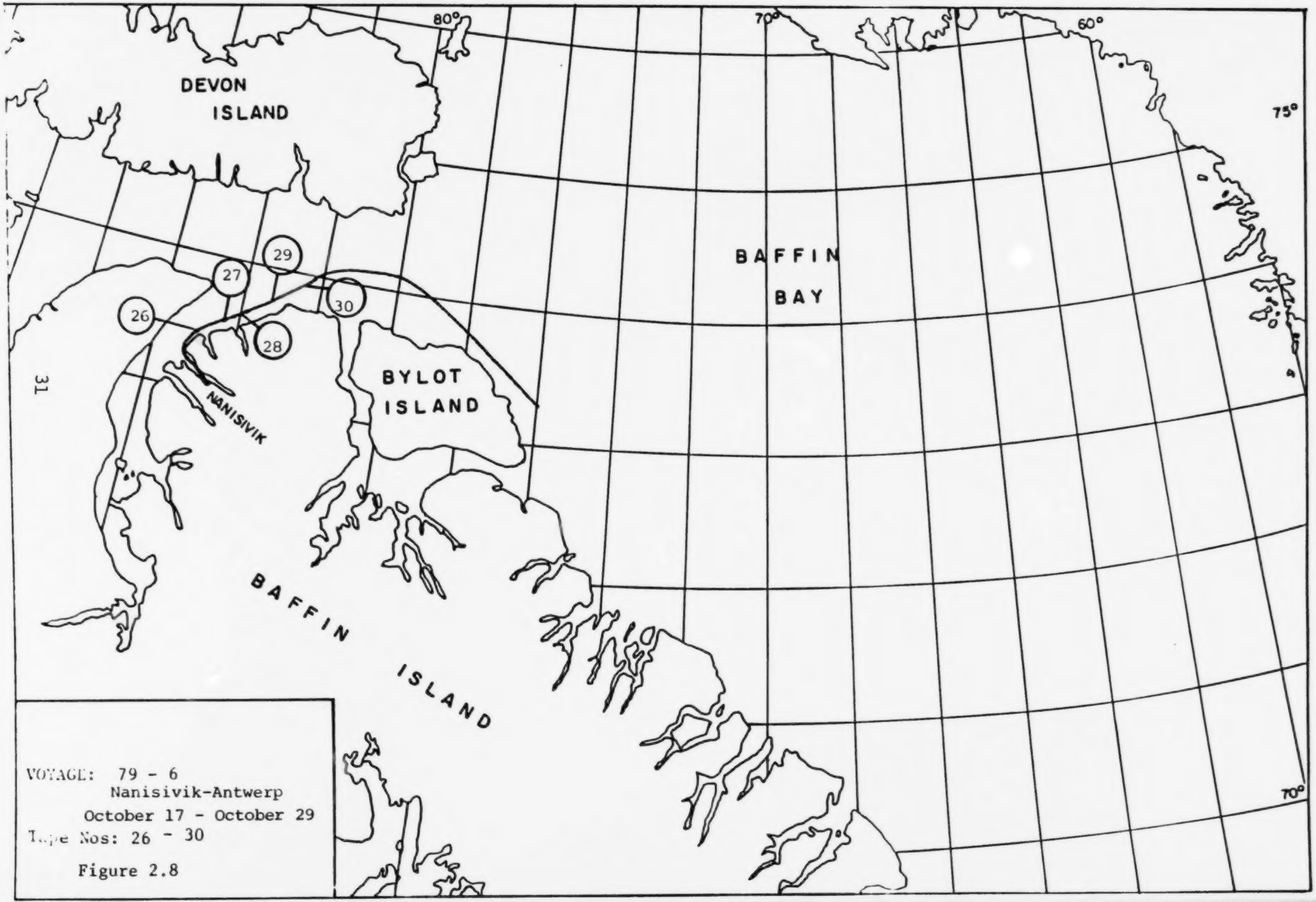

DEVON ISLAND
BYLOT ISLAND
BAFFIN BAY
BAFFIN ISLAND
NANISIVIK
80°
70°
60°
75°
70°
21
22
23
24
25

Voyage: 79 - 5

Antwerp-Nanisivik
September 19 - October 15

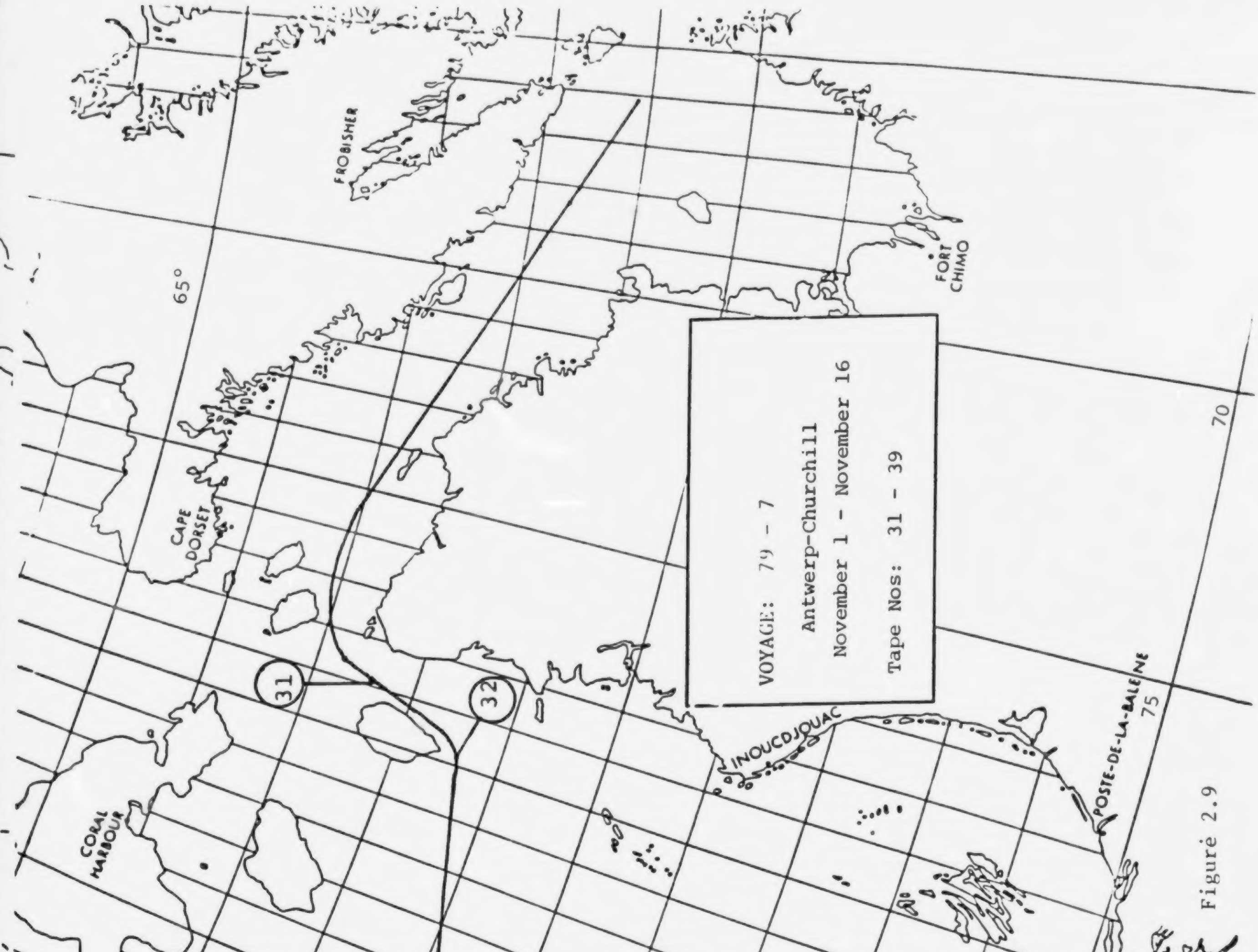
Tape Nos: 21 - 25

Figure 2.7


DEVON
ISLAND
BAFFIN
BAY
BYLOT
ISLAND
BAFFIN
ISLAND
NANISIVIK
26
27
28
29
30
80°
70°
60°
75°
70°

VOYAGE: 79 - 6
Nanisivik-Antwerp
October 17 - October 29
Tape Nos: 26 - 30

Figure 2.8


FROBISHER
FORT CHIMO
CAPE DORSET
CORAL HARBOUR
CHESTERFIELD
INOUCDJOUAC
POSTE-DE-LA-BALEINE
CHURCHILL
65°
70
75
80
55
31
32
33
34
35
36
37
38
39

VOYAGE: 79 - 7

Antwerp-Churchill

November 1 - November 16

Tape Nos: 31 - 39

Figure 2.9

VOYAGE RECORDS

INDEX Nº 79-1-1.1
YR.-VOYAGE-TAPE FILE

DATE 25th July 1979

RECORDING TIME 0211:10 TO 0253:30 GMT

ELAPSED TIME 0 H 42 M 20 S

CONTRACTOR: German & Milne Inc.

FINAL REPORT Nº 2627 TP

LOCATION Admiralty Inlet

LAT: 73° 27 'N
LONG: 84° 34 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.7 M
AFT: 10.8 M

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	90	180	Compact pack ice
ICE COVER 1Y 2Y+MY TOT	TENTHS		*	10		Multiyear pieces
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒

NAME CCGS Louis S. St. Laurent

FOLLOWING ☒

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE Determine structural response to ice breaking

REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis

RECORDING NOTES

MODE RECORDING ☒

STANDBY ☐ INTERVAL= SECS

TAPE INFO HEADER ☐ EOF ☐

OMIT CHANNELS: 33,61,66,75,84,101,110,119,121,122,125,128,130,131,136,138,146,
(SEE APPENDIX A) 164,203,208,239,240

VIDEO RECORDING TAPE Nº: 79-VT1

TIME: 0213 TO GMT

PHOTOS = 3

1 - 6 TO 1 - 8

COMMENTS Software read errors. Tape may be invalid.

No printout available

VOYAGE RECORDS

INDEX Nº 79-1-2.1
YR. - VOYAGE - TAPE FILE

DATE 26th July 1979	RECORDING TIME 1233:00	TO 1234:46	GMT
	ELAPSED TIME 0 H	1 M	46 S

CONTRACTOR: German & Milne Inc. FINAL REPORT Nº 2627 TP

LOCATION Admiralty Inlet LAT: 73 ° 22 'N LONG: 85 ° 1 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.7 M CARGO ☐ BUBBLER ON ☐
AFT: 10.8 M BALLAST ☒ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	90	180	Compact pack ice
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS		*	10		
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis S. St. Laurent
FOLLOWING ☒
IN ATTENDANCE ☐

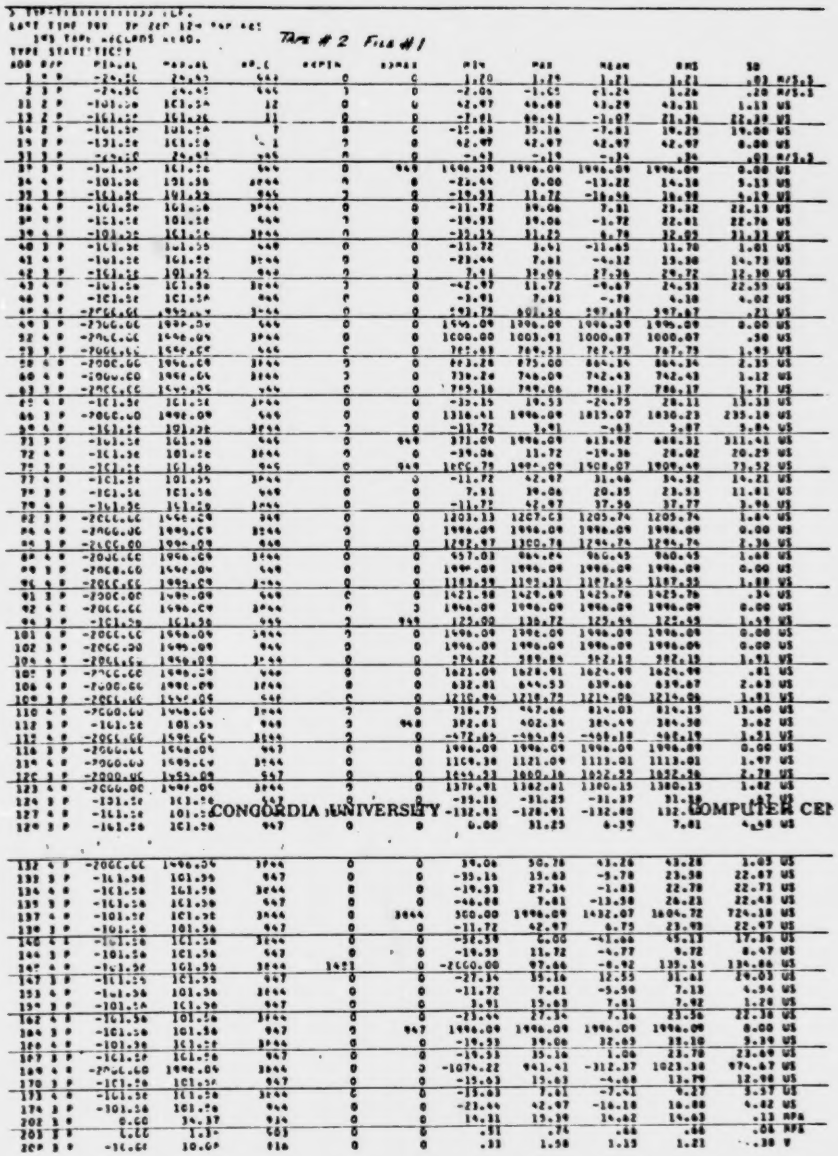
RATIONALE
REASON FOR TAPE Determine structural response to ice breaking
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis.

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS: 15,33,49,52,66,75,84,89,92,101,102,110,116,127,164,208
(SEE APPENDIX A)

VIDEO RECORDING - TAPE Nº: PHOTOS = -
TIME: TO GMT # TO

COMMENTS Actual gauge readings, in microstrains, are equal to one half the values on printout. See Appendix A


Tape # 2 File #1

CONCORDIA UNIVERSITY COMPUTER CEN

VOYAGE RECORDS

INDEX Nº 79-1-2.2
YR. - VOYAGE - TAPE FILE

DATE 26th July 1979
RECORDING TIME 1236:12 TO 1320:23 GMT
ELAPSED TIME 0 H 44 M 11 S

CONTRACTOR : German & Milne Inc.
FINAL REPORT Nº 2627 TP

LOCATION Admiralty Inlet
LAT : 73 ° 22 'N
LONG : 85 ° 1 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.7 M
AFT: 10.8 M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	90	120	
ICE COVER 1Y 2Y+MY TOT	TENTHS		*	10		
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

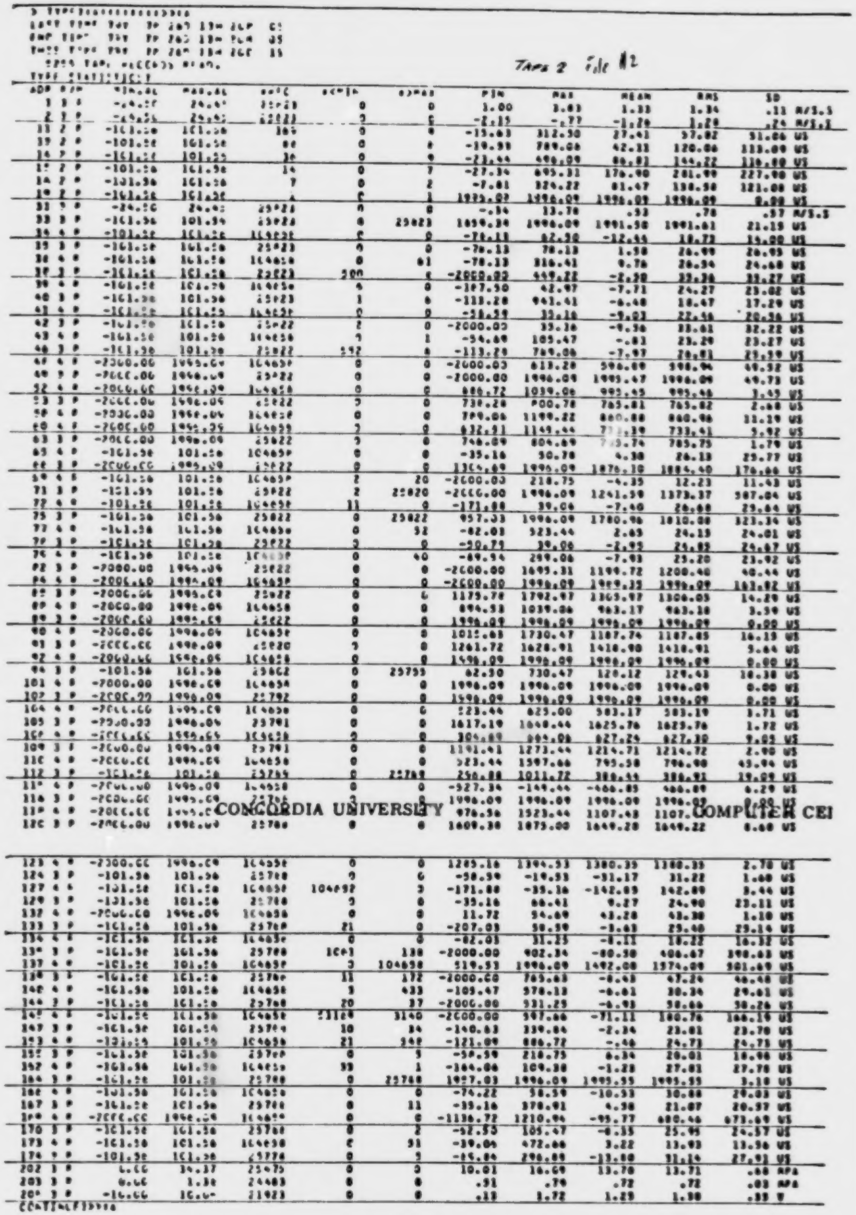
ICEBREAKER SUPPORT ☒
NAME CCGS Louis S. St. Laurent
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE Determine structural response to ice breaking
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis

RECORDING NOTES
MODE RECORDING ☒
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS: 15,33,49,52,66,75,84,89,92,101,102,110,116,127,164,208
(SEE APPENDIX A)

VIDEO RECORDING - TAPE Nº:
TIME : TO GMT
PHOTOS = 5
# 1 - 9 TO 1 - 14

COMMENTS Actual gauge readings, in Microstrains, are equal to one half the values on the printout. See Appendix A


Tape 2 File #2
CONCORDIA UNIVERSITY
COMPUTER CEI

VOYAGE RECORDS

INDEX Nº 79-1-3.1
YR. - VOYAGE - TAPE FILE

DATE: 26th July 1979

RECORDING TIME 1939:16 TO 2015:04 GMT

ELAPSED TIME 00 H 35 M 48 S

CONTRACTOR: German & Milne Inc.

FINAL REPORT Nº 2627 TP

LOCATION: Admiralty Inlet and Strathcona Sound

LAT: 73 ° 'N

LONG: 85 ° 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: 10.7 M

AFT: 10.8M

CARGO ☐

BALLAST ☒

BUBBLER ON ☒

OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	90 – 120	Compact pack ice
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS		*	10	Multiyear pieces
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒

NAME CCGS Louis S. St. Laurent

FOLLOWING ☒

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE: Determine structural response to ice breaking

REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis

RECORDING NOTES

MODE: RECORDING ☒

STANDBY ☐

INTERVAL = SECS

TAPE INFO: HEADER ☒ EOF ☒

OMIT CHANNELS: (SEE APPENDIX A) 66,75,110,127,203,208,239,240

VIDEO RECORDING -

TIME: TO

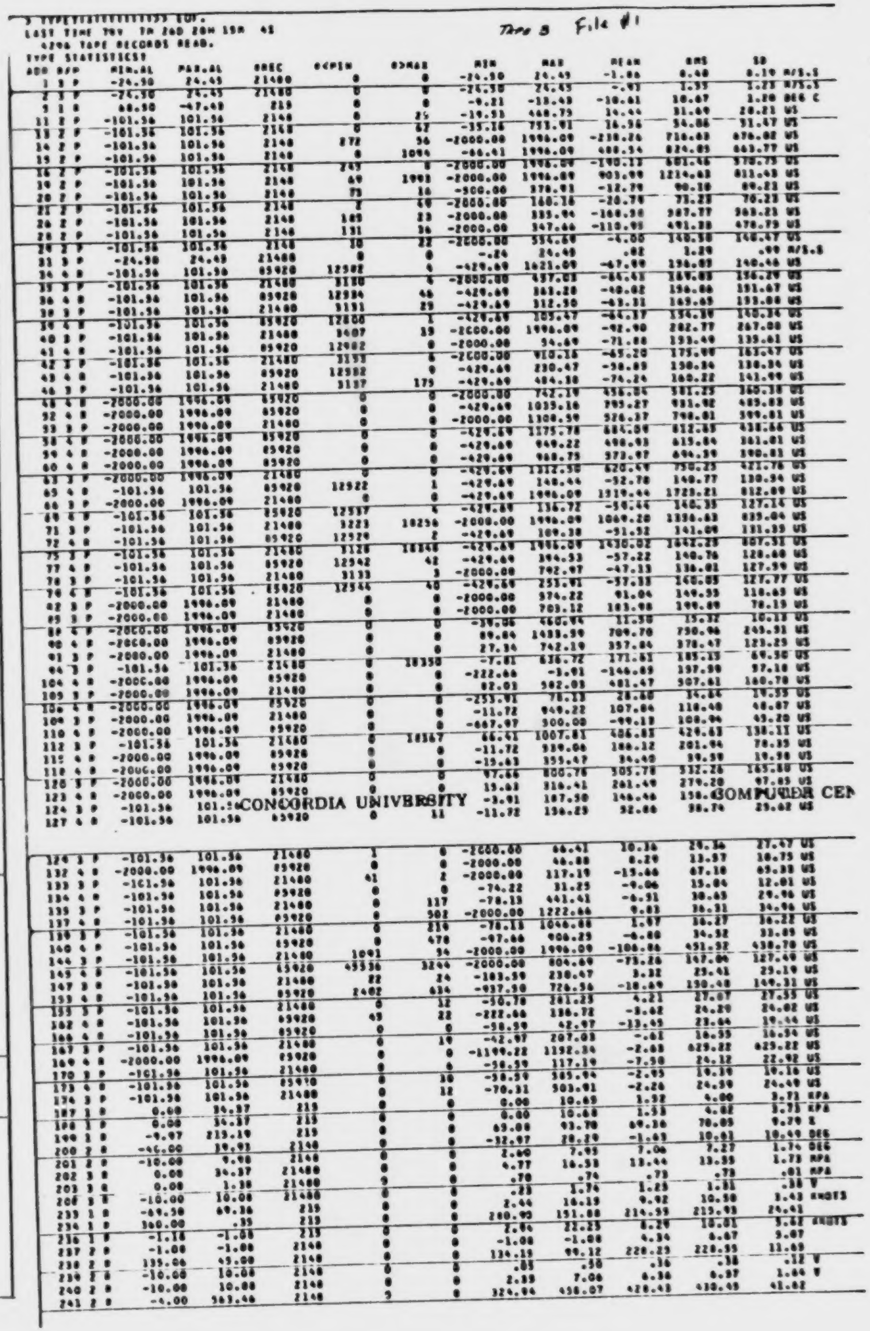
TAPE Nº:

GMT

PHOTOS = -

TO

COMMENTS: Actual gauge readings, in Microstrains, are equal to one half the values on the printout. See Appendix A



Tape 3 File #1

CONCORDIA UNIVERSITY COMPUTER CEN

VOYAGE RECORDS

INDEX Nº 79-1-3.2
YR.-VOYAGE-TAPE FILE

DATE 26th July 1979

RECORDING TIME 2016:53 TO 2029:00 GMT
ELAPSED TIME 00 H 12 M 07 S

CONTRACTOR: German & Milne Inc

FINAL REPORT Nº 2627 TP

LOCATION Admiralty Inlet and Strathcona Sound
LAT: 73 ° 'N
LONG: 85 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.7 M
AFT: 10.8 M
CARGO ☐
BALLAST ☒
BUBBLER ON ☒
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	90	120	Compact pack ice
ICE COVER (1Y, 2Y+MY, TOT)	TENTHS		*	10		Some multiyear pieces
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis S. St. Laurent
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE Determine structural response to ice breaking

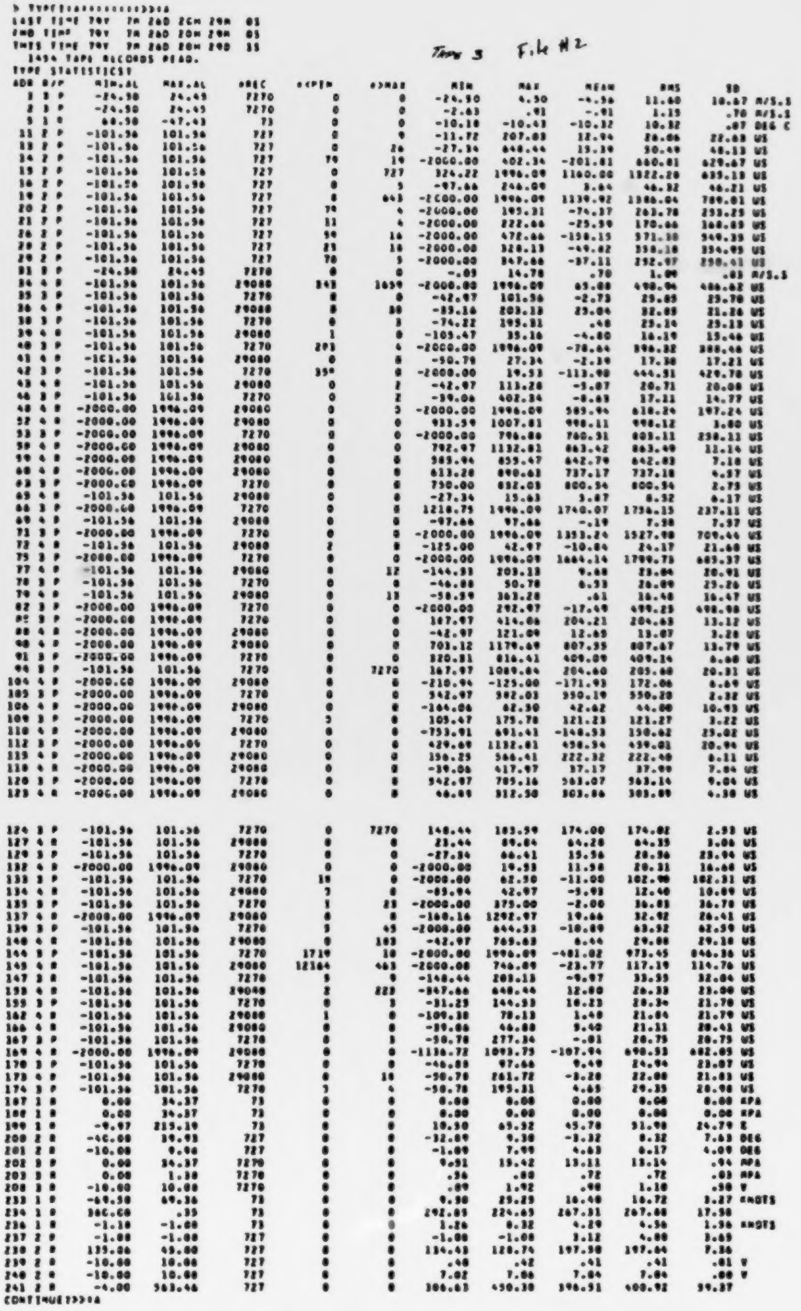
REASON FOR SAMPLING PATTERN: To collect broad range of data for possible future analysis. Alarms on sensors set to ±50 με

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☒
INTERVAL= 30 SECS
TAPE INFO HEADER ☒
EOF ☐
OMIT CHANNELS: 66,75,110,127,203,208,239,240
(SEE APPENDIX A)

VIDEO RECORDING - TAPE Nº:
TIME: TO GMT
PHOTOS = -
# TO

COMMENTS Actual gauge readings, in Microstrains, are equal to one half the values on the printout. See Appendix A.



Tape 3 File #2

VOYAGE RECORDS	INDEX Nº 79-2-4.1 YR.–VOYAGE–TAPE FILE

DATE 29th July 1979 RECORDING TIME 1803:11 TO 1805:01 GMT
ELAPSED TIME 00 H 01 M 50 S

CONTRACTOR : German & Milne Inc. FINAL REPORT Nº 2627 TP

LOCATION Admiralty Inlet LAT : 73 ° 17 'N
LONG : 85 ° 16 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☒ BUBBLER ON ☐
AFT: M BALLAST ☐ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	90 180	
ICE COVER 1Y 2Y+MY TOT	TENTHS			5 5 10	Compact pack ice
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis S. St. Laurent
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE Determine structural response to ice breaking.

REASON FOR SAMPLING PATTERN: To collect broad range of data for possible future analysis. Alarms set to record impacts >50 με

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☒ INTERVAL= 30 SECS
TAPE INFO HEADER ☐ EOF ☒
OMIT CHANNELS: (SEE APPENDIX A) 41,66.75,110,127

VIDEO RECORDING - TAPE Nº: PHOTOS = -
TIME : TO GMT # TO

COMMENTS Actual gauge readings, in Microstrains, are equal to one half the values on the printout. See Appendix A.

```
LAST TIME 79Y  7M 29D 18H  5M  1S                                        TAP1
   222 TAPE RECORDS READ.
TYPE STATISTICS?                    TAPE 4  FILE 1
? AL
ADR R/M    MIN.AL   MAX.AL   #REC  #<MIN  #>MAX      MIN      MAX     MEAN      RMS       SD
  1 3 P      -.08     -.34   1036      0   1036      .86     2.44     1.21     1.22      .13 M/S.S
  2 3 P      1.72     5.60   1036   1036      0    -2.06     -.91    -1.13     1.14      .10 M/S.S
 31 3 P       .33    -3.49   1036   1036   1036    -2.15    -1.44    -1.52     1.53      .14 M/S.S
 34 4 R    363.28 -1546.88   4381   4381   4381   -15.63    23.44     -.45     1.57     1.51 US
 35 3 P     11.72    27.34   1036    515      1     7.81    31.25    16.22    18.48     8.86 US
 36 4 R    375.00 -1531.25   4381   4381   4381   -11.72    31.25     5.87     6.32     2.35 US
 38 3 P    390.63 -1515.63   1036   1036   1036   -23.44   113.28    12.72    31.17    28.47 US
 39 4 R    242.19    27.34   4381   4381      0   -58.59    -3.91   -23.67    23.78     2.21 US
 40 3 P    406.25 -1507.81   1036    274    763 -2000.00  1488.28   439.74  1526.73  1462.74 US
 41 4 R     23.44    35.16   4381      0   4381  1996.09  1996.09  1996.09  1996.09     0.00 US
 42 3 P    414.06 -1496.09   1035   1035   1035    -3.91    31.25      .49     1.72     1.65 US
 43 4 R     19.53   -15.63   4381   2152   4381   -11.72    27.34    12.98    15.76     8.93 US
 46 3 P    429.69   132.81   1035   1035      0   -27.34    97.66    11.14    30.19    28.07 US
 48 4 R    449.22   140.63   4381      0   4381   601.56   609.38   607.64   607.64     1.94 US
 52 4 R    460.94   160.16   4381      0   4381   945.31   976.56   971.31   971.32     2.25 US
 53 3 P     19.53  1996.09   1035      0      0   750.00   777.34   767.64   767.64     2.16 US
 58 3 P    515.63   203.13   1035   1035      0  -246.09    78.13    59.69    69.30    35.24 US
 59 4 R     15.63   968.75   4381      0      0    82.03   238.28   223.86   225.08    23.47 US
 60 4 R    523.44   230.47   4381      0   4381   945.31   980.47   971.39   971.39     2.23 US
 63 3 P    -19.53   968.75   1035   1035      0  -175.78   -78.13   -86.83    87.43    10.17 US
 65 4 R     11.72   -23.44   4381   4381   1366   -35.16     3.91   -25.55    26.05     5.08 US
 66 3 P    566.41   269.53   1035      0   1035  1648.44  1996.09  1974.49  1974.85    37.48 US
 69 4 R     19.53 -2000.00   4381   4351   4381   -19.53    42.97     2.56     5.14     4.46 US
 71 3 P      3.91     0.00   1035      0   1035  1535.16  1996.09  1752.29  1766.90   226.88 US
 72 4 R    648.44   308.59   4381   4381      0 -2000.00    19.53 -1064.49  1459.56   998.70 US
 75 3 P      7.81   -15.63   1035    593    442 -2000.00   453.13  -811.31  1343.39  1071.25 US
 77 4 R      3.91    27.34   4381   2242     10   -19.53    46.88     2.94     5.83     5.03 US
 78 3 P  -1679.69   359.38   1035    555      0 -2000.00    -3.91 -1100.41  1466.02   969.14 US
 79 4 R     50.78    15.63   4381      0   4381   714.84  1996.09  1748.76  1763.89   230.59 US
 82 3 P  -1644.53   375.00   1035      0      0   -11.72    39.06    10.60    21.03    18.17 US
 85 3 P   -117.19   242.19   1035      0      0   -11.72    27.34    11.57    12.07     3.44 US
 88 4 R  -1601.56   414.06   4381      0      0   -27.34    27.34    -9.42    14.24    10.68 US
 90 4 R  -1589.84   421.88   4381      0      0   -19.53    31.25     7.71    19.15    17.53 US
 91 3 P     85.94   246.09   1035   1035      0  -265.63   -89.84   -98.36    99.97    17.85 US
 92 4 R    132.81   429.69   4381   4381      0     3.91    19.53    10.15    11.40     5.20 US
 93 4 R      0.00    42.97   4381     26      0   -50.78    27.34     9.51    10.35     4.09 US
 94 3 P    140.63   449.22   1035   1035      0  -187.50   -97.66  -121.43   121.77     9.13 US
 96 4 R    152.34   457.03   4381   4377      0     0.00   167.97    21.61    22.74     7.09 US
 97 3 P    -23.44    42.97   1035      0   1035    82.03   156.25    92.42    92.51     4.12 US
100 4 R    167.97   480.47   4381      0      0   214.84   292.97   244.12   244.15     4.13 US
102 3 P    187.50   496.09   1035   1035      0    39.06    54.69    47.30    47.37     2.48 US
104 4 R    203.13   515.63   4381   4381      0     0.00   175.78    20.92    22.10     7.11 US
105 3 P    972.66    11.72   1035   1035   1035    46.88   101.56    88.73    88.79     3.27 US
106 4 R    230.47   523.44   4381   4381      0    11.72    85.94    20.32    20.57     3.15 US
108 4 R    234.38   535.16   4381     21      0   214.84   246.88   244.19   244.23     4.17 US
109 3 P    968.75   -19.53   1035   1035      0  -289.06   -62.50  -115.62   145.69    88.70 US
110 4 R    253.91   546.88   4381   4381      0    27.34    50.78    43.08    43.16     2.52 US
112 3 P    269.53   566.41   1035   1035      0    -3.91   164.06    12.13    16.19    10.72 US
115 4 R  -2000.00    19.53   4381      0      0   -42.97    15.63   -27.35    27.40     1.75 US
116 3 P    300.78   632.81   1035   1035      0    19.53   175.78    31.36    33.87    12.80 US
117 4 R      3.91     3.91   4381      0   4381    11.72   332.03    44.04    44.57     6.86 US
118 4 R    308.59   648.44   4381   4381      0   -35.16    93.75    19.76    20.07     3.52 US
120 3 P    343.75   660.16   1035   1035      0   -31.25   140.63     7.55    10.78     7.70 US
123 4 R     23.44     3.91   4381   4381      2   -42.97    15.63   -27.33    27.39     1.78 US
124 3 P    359.38 -1996.09    981    981    981     3.91   164.06    26.10    27.18     7.60 US
126 3 P    363.28 -1992.19    885    885    885    23.44   109.38    33.75    34.20     5.51 US
127 4 R     11.72   -89.84   4381   4381      0 -1800.78 -1796.88 -1796.89  1796.89      .23 US
129 3 P     19.53  -121.09    852    451    852   -19.53    35.16      .05    18.89    18.90 US
132 4 R    406.25 -1851.56   4381   4381   4381     7.81    19.53    15.43    15.46      .85 US
133 3 P     19.53    39.06    846    835      3   -35.16    62.50    -4.77    19.36    18.77 US
134 4 R    414.06 -1843.75   4381   4381   4381   -46.88    39.06    -4.39    37.35    37.09 US
135 2 R     19.53  1316.41    275    268      0   -42.97   117.19    -4.96    19.20    18.58 US
137 4 R    242.19     3.91   4381   4381   2035   -23.44    27.34    -2.30    19.12    18.98 US
139 1 R     42.97     3.91     12     12      0  -105.47   -89.84   -96.35    96.42     3.85 US
140 4 R    449.22   140.63   4381   4381      0     7.81    27.34    15.35    15.84     3.90 US
145 4 R     19.53  1996.09   4381   2394      0   -78.13   105.47    16.23    17.73     7.14 US
153 4 R    -39.06   234.38   4381      3      0  -273.44   105.47    16.14    18.22     8.45 US
162 4 R    632.81   300.78   4381   4381      0   -11.72    35.16     3.63     4.03     1.75 US
166 4 R    660.16   343.75   4381   4381      0   -23.44    27.34    13.73    16.66     9.45 US
169 4 R     -3.91   -27.34   4381      1      0     0.00    15.63    10.56    10.73 [illegible] US
173 4 R    214.84    11.72   4381   4381      0     0.00    11.72     5.25     5.57     1.87 US
```

VOYAGE RECORDS

INDEX Nº 79-2-4.2
YR.-VOYAGE-TAPE FILE

DATE 29th July 1979

RECORDING TIME 1815:08 TO 1816:59 GMT
ELAPSED TIME 00 H 01 M 51 S

CONTRACTOR : German & Milne Inc.

FINAL REPORT Nº 2627 TP

LOCATION Admiralty Inlet

LAT : 73 ° 17 'N
LONG : 85 ° 16 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.8 M
AFT: 11.3 M

CARGO ☒
BALLAST ☐

BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM		*			90			180	Compact pack ice
ICE COVER 1Y 2Y+MY TOT	TENTHS		*	5	5	10				
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis S. St. Laurent
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE Determine structural response to ice breaking.

REASON FOR SAMPLING PATTERN: To collect broad range of data for possible future analysis. Alarms set to record impacts >50 με

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☒
INTERVAL= 30 SECS
TAPE INFO HEADER ☒
EOF ☒
OMIT CHANNELS: (SEE APPENDIX A) 41,66,75,110,127

VIDEO RECORDING - TAPE Nº:
TIME : TO GMT
PHOTOS = -
# TO

COMMENTS Actual gauge readings, in Microstrains, are equal to one half the values on the printout. See Appendix A.

```
LAST TIME 79Y  7M 29D 18H 16M 59S                                                      TAPE
    218 TAPE RECORDS READ.
TYPE STATISTICS?                 TAPE 4  FILE 2
* AL
ADR R/M    MIN.AL    MAX.AL    #REC   #<MIN   #>MAX      MIN      MAX     MEAN      RMS       SD
  1 3 P    -24.50     24.45    1018      0       0       .96     3.30     1.22     1.22      .13 M/S.S
  2 3 P    -24.50     24.45    1018      0       0     -1.77     -.77    -1.14     1.14      .11 M/S.S
 31 3 P    -24.50     24.45    1018      0       0     -2.30    -1.39    -1.53     1.54      .15 M/S.S
 34 4 R   -101.56    101.56    4303      0       0    -31.25     0.00   -12.05    12.13     1.39 US
 35 3 P   -101.56    101.56    1018      0       0    -19.53    42.97    -8.73    13.16     9.86 US
 36 4 R   -101.56    101.56    4303      0       0    -11.72    27.34    -1.18     2.61     2.33 US
 38 3 P   -101.56    101.56    1018      0       1    -54.69   105.47   -10.41    37.75    36.30 US
 39 4 R   -101.56    101.56    4303      0       0    -70.31     3.91   -39.40    39.49     2.69 US
 40 3 P   -101.56    101.56    1018     14    1002  -2000.00  1488.28  1254.60  1320.64   412.58 US
 41 4 R   -101.56    101.56    4303      0    4303   1996.09  1996.09  1996.09  1996.09     0.00 US
 42 3 P   -101.56    101.56    1017      0       0    -15.63    15.63   -11.64    11.70     1.19 US
 43 4 R   -101.56    101.56    4303      0       0    -58.59     7.81   -10.42    15.22    11.09 US
 46 3 P   -101.56    101.56    1017      0       0    -54.69    97.66   -11.95    38.53    36.65 US
 48 4 R  -2000.00   1996.09    4303      0       0    601.56   609.38   607.42   607.43     1.96 US
 52 4 R  -2000.00   1996.09    4303      0       0    945.31   976.56   973.71   973.71     2.02 US
 53 3 P  -2000.00   1996.09    1016      0       0    753.91   773.44   769.71   769.71     1.12 US
 58 3 P  -2000.00   1996.09    1016      0       0    -74.22    78.13    56.98    65.83    32.98 US
 59 4 R  -2000.00   1996.09    4303      0       0     70.31   238.28   221.92   223.54    26.79 US
 60 4 R  -2000.00   1996.09    4303      0       0    945.31   976.56   973.90   973.90     2.09 US
 63 3 P  -2000.00   1996.09    1016      0       0   -152.34   -74.22   -85.59    86.01     8.47 US
 65 4 R   -101.56    101.56    4303      0       0    -11.72    35.16    30.43    30.50     2.03 US
 66 3 P  -2000.00   1996.09    1016      0       0   1386.72  1996.09  1720.79  1733.14   206.68 US
 69 4 R   -101.56    101.56    4303      0       0    -42.97    42.97    -1.21     9.86     9.79 US
 71 3 P  -2000.00   1996.09    1016      0       0   1117.19  1996.09  1428.91  1467.00   332.31 US
 72 4 R   -101.56    101.56    4303   4300       2  -2000.00  1996.09 -1403.69  1551.82   661.74 US
 75 3 P  -2000.00   1996.09    1016      0       0  -2000.00     0.00 -1217.88  1482.57   845.87 US
 77 4 R   -101.56    101.56    4303      0       0    -42.97    50.78    -1.10     9.56     9.50 US
 78 3 P   -101.56    101.56    1016   1016       0  -2000.00  -824.22 -1506.46  1603.77   550.42 US
 79 4 R   -101.56    101.56    4303      0    4303    730.47  1968.75  1414.43  1452.87   332.05 US
 82 3 P   -101.56    101.56    1016      0       0    -39.06    23.44   -24.27    24.83     5.24 US
 85 3 P   -101.56    101.56    1016      0       0    -58.59    66.41   -31.18    33.72    12.85 US
 88 4 R   -101.56    101.56    4303      0       0    -35.16    15.63    -7.27    15.74    13.96 US
 90 4 R   -101.56    101.56    4303      0       0    -46.88     7.81   -27.35    27.88     5.44 US
 91 3 P   -101.56    101.56    1016    641       0   -187.50   -82.03  -105.91   106.52    11.41 US
 92 4 R   -101.56    101.56    4303      0       0      0.00    15.63     2.35     3.06     1.97 US
 93 4 R   -101.56    101.56    4303      0       0    -62.50    15.63   -32.87    35.07    12.23 US
 94 3 P   -101.56    101.56    1016    467       0   -261.72   -93.75  -113.04   114.89    30.58 US
 96 4 R   -101.56    101.56    4303      0       2      0.00   160.16    21.79    22.58     5.92 US
 97 3 P   -101.56    101.56    1016      0      11     82.03   429.69    92.13    92.79    11.04 US
100 4 R   -101.56    101.56    4303      0    4303    226.56   304.69   247.83   247.85     3.53 US
102 3 P   -101.56    101.56    1016      0       0     35.16    50.78    43.53    43.57     2.04 US
104 4 R   -101.56    101.56    4303      0       2      0.00   167.97    22.07    22.86     5.96 US
105 3 P   -101.56    101.56    1016      0       2     58.59   113.28    88.22    88.27     3.06 US
106 4 R   -101.56    101.56    4303      0       0     15.63    85.94    20.54    20.69     2.45 US
108 4 R   -101.56    101.56    4303      0    4303    222.66   304.69   247.89   247.92     3.57 US
109 3 P   -101.56    101.56    1016    341       0   -285.16   -42.97  -180.42   209.68   106.90 US
110 4 R  -2000.00   1996.09    4303      0       0     19.53    46.88    39.96    40.04     2.43 US
112 3 P   -101.56    101.56    1016      0       4      3.91   343.75    13.35    20.02    14.93 US
115 4 R   -101.56    101.56    4303      0       0    -50.78    23.44   -28.06    28.16     2.42 US
116 3 P   -101.56    101.56    1016      0      11     19.53   496.09    32.84    38.57    20.23 US
117 4 R   -101.56    101.56    4303      0       2     31.25   144.53    44.47    44.64     3.94 US
118 4 R   -101.56    101.56    4303      0       1      3.91   121.09    20.76    21.08     3.64 US
120 3 P   -101.56    101.56    1002      0       1    -11.72   160.16     8.71    11.43     7.41 US
123 4 R   -101.56    101.56    4303      0       0    -50.78    27.34   -28.15    28.26     2.53 US
124 3 P   -101.56    101.56     867      0       3    -35.16   175.78    26.67    28.18     8.87 US
126 3 P   -101.56    101.56     838      0       2     23.44   199.22    35.26    36.10     7.73 US
127 4 R  -2000.00   1996.09    4303      0       0  -1800.78 -1796.88 -1796.89  1796.89      .28 US
129 3 P   -101.56    101.56     833      0       0      0.00    27.34     7.62     8.98     4.74 US
132 4 R  -2000.00   1996.09    4303      0       0      7.81    19.53    15.57    15.58      .49 US
133 3 P   -101.56    101.56     618      0       0    -27.34    54.69   -18.88    19.74     5.78 US
134 4 R   -101.56    101.56    4303      0       0    -46.88    42.97     1.93    41.05    41.01 US
135 3 P   -101.56    101.56      39      0       1    -19.53   242.19    -8.01    43.40    43.21 US
137 4 R   -101.56    101.56    4303      0       0     -3.91    19.53     4.74     7.01     5.16 US
140 4 R   -101.56    101.56    4303      0       0      7.81    31.25    18.42    18.50     1.88 US
145 4 R   -101.56    101.56    4303   4289       0   -230.47   -11.72  -201.53   202.43    18.93 US
153 4 R   -101.56    101.56    4303   4289       0   -230.47   -11.72  -201.69   202.56    18.68 US
162 4 R   -101.56    101.56    4303      0       0    -27.34    19.53     8.18     9.24     4.30 US
166 4 R   -101.56    101.56    4303      0       0    -19.53    11.72     3.53     5.77     4.56 US
169 4 R  -2000.00   1996.09    4303      0       0      0.00    15.63     9.42     9.62     1.98 US
173 4 R   -101.56    101.56    4303      0       0      0.00    11.72     4.44     4.65     1.37 US
```

VOYAGE RECORDS

INDEX Nº
79-2-4.3
YR.-VOYAGE-TAPE FILE

DATE 29th July 1979	RECORDING TIME	1831:37	TO	1833:44	GMT
	ELAPSED TIME	00 H	02 M	07 S	

CONTRACTOR : German & Milne Inc.
FINAL REPORT Nº 2627 TP

LOCATION Admiralty Inlet
LAT : 73 ° 17 'N
LONG : 85 ° 16 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.8 M
AFT: 11.3 M
CARGO ☒
BALLAST ☐
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM		*			90			180	
ICE COVER IY | 2Y+MY | TOT	TENTHS		*	5	5	10				Compact pack ice
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis S. St. Laurent
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE Determine structural response to ice breaking.

REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis. Alarms set to record impacts >50 με

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☒
INTERVAL= 30 SECS
TAPE INFO HEADER ☒
EOF ☒
OMIT CHANNELS: (SEE APPENDIX A) 41,66,75,110,127

VIDEO RECORDING
TIME : 1831:20 TO 1832:59 GMT
TAPE Nº: 79-VT2
PHOTOS = -
# TO

COMMENTS Actual gauge readings, in Microstrains, are equal to one half the values on the printout. See Appendix A

```
LAST TIME 79Y  7M 29D 18H 33M 44S                                                                          TP#3
   255 TAPE RECORDS READ.
TYPE STATISTICS?                       TAPE 4  FILE 5
? AL
ADR R/M    -MIN.AL    MAX.AL     #REC     #<MIN    #>MAX       MIN       MAX      MEAN       RMS        SD
  1 3 P     -24.50     24.45     1189         0        0       .86      2.77      1.21      1.22       .16 M/S.S
  2 3 P     -24.50     24.45     1189         0        0     -2.06      -.91     -1.14      1.14       .11 M/S.S
 31 3 P     -24.50     24.45     1189         0        0     -2.20     -1.39     -1.52      1.53       .14 M/S.S
 34 4 R    -101.56    101.56     5034         0        0    -23.44      0.00    -11.11     11.56      3.19 US
 35 3 P    -101.56    101.56     1189         0        0    -11.72     11.72      -.50      3.11      3.07 US
 36 4 R    -101.56    101.56     5034         0        0    -23.44     54.69       .46     15.65     15.65 US
 38 3 P    -101.56    101.56     1189         0        1    -11.72    191.41      4.51      8.09      6.72 US
 39 4 R    -101.56    101.56     5034         0        0    -15.63     11.72       .89      3.06      2.93 US
 40 3 P    -101.56    101.56     1189        10     1179  -2000.00   1519.53   1287.82   1323.43    305.08 US
 41 4 R    -101.56    101.56     5034         0     5034   1996.09   1996.09   1996.09   1996.09      0.00 US
 42 3 P    -101.56    101.56     1188         0        0    -19.53     11.72    -10.40     10.94      3.38 US
 43 4 R    -101.56    101.56     5034         0        0    -15.63      7.81     -1.14      3.77      3.59 US
 46 3 P    -101.56    101.56     1187         0        0    -19.53     27.34      2.43      4.62      3.93 US
 48 4 R   -2000.00   1996.09     5034         0        0    601.56    625.00    608.96    608.96      1.45 US
 52 4 R   -2000.00   1996.09     5034         0        0    917.97    988.28    979.29    979.29      2.37 US
 53 3 P   -2000.00   1996.09     1187         0        0    769.53    781.25    773.78    773.78      1.48 US
 58 3 P   -2000.00   1996.09     1187         0        0   -136.72     78.13     64.72     68.52     22.52 US
 59 4 R   -2000.00   1996.09     5034         0        0     85.94    238.28    227.03    228.06     21.58 US
 60 4 R   -2000.00   1996.09     5034         0        0    921.88    988.28    979.23    979.23      2.37 US
 63 3 P   -2000.00   1996.09     1187         0        0   -167.97    -78.13    -84.44     84.69      6.49 US
 65 4 R    -101.56    101.56     5034         0        0    -15.63     19.53      -.29     10.54     10.53 US
 66 3 P   -2000.00   1996.09     1187         0        0   1421.88   1996.09   1724.67   1743.85    258.04 US
 69 4 R    -101.56    101.56     5034         0        0    -58.59     42.97    -17.02     24.86     18.12 US
 71 3 P   -2000.00   1996.09     1187         0        0    261.72   1996.09    639.10    742.73    378.56 US
 72 4 R    -101.56    101.56     5034      2669        0  -2000.00     11.72   -586.16    838.47    599.61 US
 75 3 P   -2000.00   1996.09     1187         0        0  -2000.00    425.78   -554.96    785.81    556.58 US
 77 4 R    -101.56    101.56     5034         0        0    -54.69     46.88    -16.73     24.75     18.24 US
 78 3 P    -101.56    101.56     1187      1186        0  -2000.00    -19.53   -786.70   1021.46    651.79 US
 79 4 R    -101.56    101.56     5034         0     5034    261.72   1996.09    634.80    736.80    374.08 US
 82 3 P    -101.56    101.56     1187         0        0    -50.78     70.31    -26.95     28.96     10.62 US
 85 3 P    -101.56    101.56     1187         0        3    -82.03    207.03    -38.90     46.81     26.05 US
 88 4 R    -101.56    101.56     5034         3        4   -214.84    175.78    -14.10     21.70     16.50 US
 90 4 R    -101.56    101.56     5034         0        0    -82.03     31.25    -30.70     32.12      9.46 US
 91 3 P    -101.56    101.56     1187       799        0   -207.03    -31.25   -112.48    114.21     19.82 US
 92 4 R    -101.56    101.56     5034         0        0    -11.72     15.63      1.54      3.20      2.81 US
 93 4 R    -101.56    101.56     5034         4        6   -148.44    191.41    -42.16     48.52     24.02 US
 94 3 P    -101.56    101.56     1187       564        0   -261.72    -97.66   -109.94    111.35     17.64 US
 96 4 R    -101.56    101.56     5034         0       42    -50.78    503.91     25.09     31.94     19.75 US
 97 3 P    -101.56    101.56     1187         0       30     19.53    367.19     91.52     92.37     12.51 US
100 4 R    -101.56    101.56     5034         0     5034    199.22    500.00    252.28    252.74     15.31 US
102 3 P    -101.56    101.56     1187         0        0    -27.34     50.78     39.81     40.16      5.30 US
104 4 R    -101.56    101.56     5034         0       43    -54.69    492.19     25.55     32.26     19.69 US
105 3 P    -101.56    101.56     1187         0        6    -50.78    132.81     86.53     87.04      9.37 US
106 4 R    -101.56    101.56     5034         0       10      0.00    167.97     21.59     22.88      7.59 US
108 4 R    -101.56    101.56     5034         0     5034    199.22    503.91    252.30    252.77     15.48 US
109 3 P    -101.56    101.56     1187       499        0   -285.16    -39.06   -157.50    189.71    105.79 US
110 4 R   -2000.00   1996.09     5034         0        0   -101.56     46.88     35.57     36.63      8.73 US
112 3 P    -101.56    101.56     1187         0       19      0.00    511.72     16.93     38.79     34.91 US
115 4 R    -101.56    101.56     5034         0        0    -74.22    -11.72    -30.16     30.49      4.46 US
116 3 P    -101.56    101.56     1187         0       21     15.63    628.91     37.50     53.05     37.54 US
117 4 R    -101.56    101.56     5034         0        5      3.91    132.81     50.37     50.57      4.54 US
118 4 R    -101.56    101.56     5034         0       23    -19.53    269.53     21.61     25.43     13.41 US
120 3 P    -101.56    101.56     1187         0       12    -23.44    468.75     11.17     29.58     27.48 US
123 4 R    -101.56    101.56     5034         0        0    -74.22    -11.72    -30.27     30.60      4.45 US
124 3 P    -101.56    101.56     1067         0        3    -50.78    441.41     29.04     33.79     17.30 US
126 3 P    -101.56    101.56      980         0        9     23.44    289.06     36.52     40.96     18.54 US
127 4 R   -2000.00   1996.09     5034         0        0  -1800.78  -1796.88  -1796.88   1796.88       .17 US
129 3 P    -101.56    101.56      978         0        0    -42.97     27.34    -25.42     30.00     15.61 US
132 4 R   -2000.00   1996.09     5034         0        0      7.81     19.53     15.60     15.60       .40 US
133 3 P    -101.56    101.56      891         0        1    -42.97    113.28     18.00     19.42      7.30 US
134 4 R    -101.56    101.56     5034         0        0    -39.06      7.81    -17.38     18.64      6.75 US
135 3 P    -101.56    101.56       79         0        2    -50.78    250.00    -12.31     54.26     53.18 US
137 4 R    -101.56    101.56     5033         0        0    -46.88     23.44    -28.79     32.44     14.96 US
140 4 R    -101.56    101.56     5033         0        0      7.81     31.25     10.51     10.93      3.03 US
145 4 R    -101.56    101.56     5033      2363       60   -218.75    597.66    -74.16    135.18    113.03 US
153 4 R    -101.56    101.56     5033      2364       61   -218.75    597.66    -74.23    135.22    113.04 US
162 4 R    -101.56    101.56     5033         3        0   -183.59     82.03      4.08      8.66      7.63 US
166 4 R    -101.56    101.56     5033         0        0    -19.53     39.06     21.37     23.33      9.37 US
169 4 R   -2000.00   1996.09     5033         0        0      0.00     19.53     12.51     12.63      1.73 US
173 4 R    -101.56    101.56     5033         0        0      0.00     11.72      5.86      6.18      1.97 US
```

VOYAGE RECORDS

INDEX Nº 79-2-4.4
YR. – VOYAGE – TAPE FILE

DATE 29th July 1979
RECORDING TIME 1846:09 TO 1847:46 GMT
ELAPSED TIME 00 H 01 M 37 S

CONTRACTOR : German & Milne Inc.
FINAL REPORT Nº 2627 TP

LOCATION Admiralty Inlet
LAT : 73 ° 17 'N
LONG : 85 ° 16 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.8 M
AFT: 11.3 M
CARGO ☒
BALLAST ☐
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	90 180	Compact pack ice
ICE COVER [1Y] [2Y+MY] [TOT]	TENTHS		*	5 5 10	
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis S. St. Laurent
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE Determine structural response to ice breaking.
Collect broad range of data for possible future analysis.
REASON FOR SAMPLING PATTERN: Alarms set to record impact >50µε

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☒
INTERVAL= 30 SECS
TAPE INFO HEADER ☒
EOF ☒
OMIT CHANNELS: (SEE APPENDIX A) 41,66,75,110,127

VIDEO RECORDING –
TAPE Nº:
TIME : TO GMT
PHOTOS = –
# TO

COMMENTS Actual gauge readings, in Microstrains, are equal to one-half the values on the printout. See Appendix A

```
[illegible] 29D 18H 47M 46S
[illegible] TAPE RECORDS READ.
TAPE STATISTICS?
                                    TAPE 4   FILE 4
ADR R/M    MIN.AL    MAX.AL   #REC   #.MIN   #.MAX       MIN       MAX      MEAN       RMS        SD
  1 3 P    -24.50     24.45    901       0       0       .96      3.49      1.04      1.05    .10 M/S.S
  2 3 P    -24.50     24.45    901       0       0     -2.49     -1.05     -1.17      1.18    .16 M/S.S
 31 3 P    -24.50     24.45    901       0       0     -2.15     -1.44     -1.52      1.53    .14 M/S.S
 34 4 R   -101.56    101.56   3808       0       0    -27.34     -3.91    -14.80     14.97   2.28 US
 35 3 P   -101.56    101.56    901       0       0    -27.34     11.72    -17.37     17.95   4.53 US
 36 4 R   -101.56    101.56   3808       0       0    -31.25     82.03     26.42     49.14  41.44 US
 38 3 P   -101.56    101.56    901       0       1     -3.91    144.53     12.57     16.38  10.50 US
 39 4 R   -101.56    101.56   3808       0       0    -42.97      7.81    -35.13     35.49   5.08 US
 40 3 P   -101.56    101.56    901       1     900  -2000.00   1492.19   1314.09   1319.17 115.74 US
 41 4 R   -101.56    101.56   3808       0    3808   1996.09   1996.09   1996.09   1996.09   0.00 US
 42 3 P   -101.56    101.56    901       0       0    -27.34     42.97    -12.61     12.92   2.84 US
 43 4 R   -101.56    101.56   3808       0       0    -27.34      7.81    -21.17     21.62   4.38 US
 46 3 P   -101.56    101.56    901       0       0     -3.91     42.97     12.62     15.85   9.60 US
 48 4 R  -2000.00   1996.09   3808       0       0    597.66    609.38    605.47    605.47    .30 US
 52 4 R  -2000.00   1996.09   3808       0       0    972.66    988.28    984.55    984.55   1.69 US
 53 3 P  -2000.00   1996.09      0       0       0    773.44    781.25    777.77    777.77   1.25 US
 58 3 P  -2000.00   1996.09    900       0       0    -70.31     82.03     59.01     67.57  32.93 US
 59 4 R  -2000.00   1996.09   3808       0       0     70.31    242.19    224.09    225.88  28.34 US
 60 4 P  -2000.00   1996.09   3808       0       0    972.66    988.28    984.69    984.69   1.74 US
 63 3 P  -2000.00   1996.09    900       0       0   -152.34    -74.22    -85.13     85.57   8.66 US
 65 4 R   -101.56    101.56   3808       0       0    -11.72     11.72      -.21      5.21   5.21 US
 66 3 P  -2000.00   1996.09    900       0       0   1281.25   1996.09   1477.47   1478.46  54.00 US
 69 4 R   -101.56    101.56   3808       0       0    -11.72     19.53      6.76      8.74   5.55 US
 71 3 P  -2000.00   1996.09    900       0       0   1757.81   1996.09   1853.42   1856.78 111.85 US
 72 4 R   -101.56    101.56   3808    3807       0  -2000.00     11.72  -1998.94   1999.31  38.68 US
 75 3 P  -2000.00   1996.09    900       0       0  -2000.00  -1339.84  -1999.27   1999.39  22.01 US
 77 4 R   -101.56    101.56   3808       0       0     -7.81     19.53      6.96      8.72   5.26 US
 78 3 P   -101.56    101.56    900     900       0  -2000.00  -2000.00  -2000.00   2000.00   0.00 US
 79 4 R   -101.56    101.56   3808       0    3808    414.06   1996.09   1850.77   1854.43 116.47 US
 82 3 P   -101.56    101.56    900       0       1     19.53    277.34     26.65     28.40   9.82 US
 85 3 P   -101.56    101.56    900       0       1    -66.41    207.03    -42.09     45.07  16.14 US
 88 4 R   -101.56    101.56   3808       0       0    -54.69     62.50    -10.83     15.67  11.33 US
 90 4 R   -101.56    101.56   3808       0       0    -19.53     78.13     22.75     23.12   4.09 US
 91 3 P   -101.56    101.56    900     831       0   -191.41    -31.25   -109.96    110.73  13.04 US
 92 4 R   -101.56    101.56   3808       0       0      0.00     27.34     14.29     14.42   1.96 US
 93 4 R   -101.56    101.56   3808       0       0    -70.31     23.44    -44.70     46.60  13.17 US
 94 3 P   -101.56    101.56    900     176       0   -261.72    -97.66   -105.74    107.23  17.82 US
 96 4 R   -101.56    101.56   3808       0      12     -7.81    238.28     27.84     30.34  12.07 US
 97 3 P   -101.56    101.56    900       0      19     74.22    421.88     92.32     93.14  12.36 US
100 4 R   -101.56    101.56   3808       0    3808    234.38    300.78    250.49    250.55   5.69 US
102 3 P   -101.56    101.56    900       0       0     31.25     42.97     38.43     38.49   2.12 US
104 4 R   -101.56    101.56   3808       0      11     -7.81    238.28     28.16     30.63  12.05 US
105 3 P   -101.56    101.56    900       0       8     58.59    152.34     88.54     88.68   4.99 US
106 4 R   -101.56    101.56   3808       0       2     11.72    105.47     22.25     22.74   4.70 US
108 4 R   -101.56    101.56   3808       0    3808    234.38    300.78    250.49    250.55   5.64 US
109 3 P   -101.56    101.56    900     494       0   -285.16    -42.97   -194.34    213.00 106.77 US
110 4 R  -2000.00   1996.09   3808       0       0     23.44     42.97     35.97     36.04   2.11 US
112 3 P   -101.56    101.56    900       0       3     -3.91    386.72      9.98     19.84  17.15 US
115 4 R   -101.56    101.56   3808       0       0    -35.16     11.72    -28.99     29.16   3.08 US
116 3 P   -101.56    101.56    899       0      12     19.53    457.03     36.88     42.19  20.49 US
117 4 R   -101.56    101.56   3808       0       0     27.34     66.41     40.57     40.66   2.72 US
118 4 R   -101.56    101.56   3808       0       0     -3.91     82.03     16.47     17.32   5.36 US
120 3 P   -101.56    101.56    888       0       1     -7.81    105.47      6.25     11.58   9.76 US
123 4 R   -101.56    101.56   3808       0       0    -35.16     11.72    -29.10     29.27   3.10 US
124 3 P   -101.56    101.56    772       0       3      7.81    121.09     31.67     33.13   9.80 US
126 3 P   -101.56    101.56    741       0       1     15.63    242.19     30.91     32.49  10.02 US
127 4 R  -2000.00   1996.09   3808       0       0  -1800.78  -1796.88  -1796.89   1796.89    .21 US
129 3 P   -101.56    101.56    734       0       0    -11.72     23.44      2.86     14.24  13.96 US
132 4 R  -2000.00   1996.09   3808       0       0      7.81     19.53     15.57     15.58    .48 US
133 3 P   -101.56    101.56    530       0       1    -39.06    351.56     -5.09     21.76  21.18 US
134 4 R   -101.56    101.56   3808       0       0    -42.97      0.00    -28.79     31.76  13.39 US
135 3 P   -101.56    101.56     34       0       1     15.63    183.59     26.31     38.11  27.99 US
137 4 R   -101.56    101.56   3808       0       0    -15.63     23.44      -.33     14.61  14.60 US
140 4 R   -101.56    101.56   3808       0       0     11.72     27.34     15.92     16.24   3.23 US
145 4 R   -101.56    101.56   3808    3800       0   -597.66     -7.81   -356.09    397.18 175.95 US
153 4 R   -101.56    101.56   3808    3801       0   -597.66    -31.25   -356.45    397.47 175.88 US
162 4 R   -101.56    101.56   3808       0       0    -50.78     15.63      3.21      4.81   3.58 US
164 4 R   -101.56    101.56   3808       0       0    -46.88      3.91    -42.89     42.93   1.81 US
169 4 R  -2000.00   1996.09   3808       0       0      0.00     19.53       .63      1.66   1.54 US
173 4 R   -101.56    101.56   3808       0       0      0.00     11.72      4.09      4.17    .84 US
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VOYAGE RECORDS

INDEX Nº 79-2-4.5
YR. – VOYAGE – TAPE FILE

DATE 29th July 1979

RECORDING TIME 1900:12 TO 1903:46 GMT
ELAPSED TIME H 03 M 34 S

CONTRACTOR : German & Milne Inc.

FINAL REPORT Nº 2627 TP

LOCATION Admiralty Inlet

LAT : 73 ° 17 'N
LONG : 85 ° 16 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.8 M
AFT: 11.3 M

CARGO ☒
BALLAST ☐

BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	90 180	
ICE COVER 1Y 2Y+MY TOT	TENTHS		*	5 5 10	Compact pack ice
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒

NAME CCGS Louis S. St. Laurent

FOLLOWING ☒

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE Determine structural response to ice breaking.

REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis. Alarms set to record impacts >50 με

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☒
INTERVAL= 30 SECS

TAPE INFO HEADER ☒ EOF ☒

OMIT CHANNELS: 41,66,75,110,127,139
(SEE APPENDIX A)

VIDEO RECORDING - TAPE Nº:
TIME : TO GMT

PHOTOS = -
# TO

COMMENTS Actual gauge readings, in Microstrains, are equal to one-half the values on the printout. See Appendix A.

TAPE 4 FILE 8

```
LUP.
LAST TIME 79Y  7M 29D 19H  3M 46S
   429 TAPE RECORDS READ.
TYPE STATISTICS?
? AL
ADR R/M     MIN.AL    MAX.AL    #REC   #<MIN   #>MAX       MIN       MAX      MEAN       RMS        SD
  1 3 P     -24.50     24.45    2002       0       0       .86      2.73      1.09      1.10       .10 M/S.S
  2 3 P     -24.50     24.45    2002       0       0     -1.96      -.91     -1.14      1.16       .09 M/S.S
 31 3 P     -24.50     24.45    2002       0       0     -2.35     -1.44     -1.52      1.53       .14 M/S.S
 34 4 R    -101.56    101.56    8469       0       0    -23.44     11.72    -12.37     14.12      6.82 US
 35 3 P    -101.56    101.56    2002       0       0    -35.16     23.44     -3.81     19.80     19.60 US
 36 4 R    -101.56    101.56    8469       0       0    -23.44     50.78      7.53     23.99     22.78 US
 38 3 P    -101.56    101.56    2002       0       0    -50.78     85.94    -24.84     38.39     29.28 US
 39 4 R    -101.56    101.56    8469       0       0    -35.16     11.72     -8.21     19.05     17.19 US
 40 3 P    -101.56    101.56    2002     262    1740  -2000.00   1527.34    873.05   1414.39   1115.61 US
 41 4 R    -101.56    101.56    8469       0    8469   1996.09   1996.09   1996.09   1996.09      0.00 US
 42 3 P    -101.56    101.56    2000       0       0    -19.53     50.78    -10.19     12.19      6.69 US
 43 4 R    -101.56    101.56    8469       0       0    -39.06     19.53     -6.69     20.62     19.50 US
 46 3 P    -101.56    101.56    2000       0       0    -50.78     50.78    -25.66     38.67     28.94 US
 48 4 R   -2000.00   1996.09    8469       0       0    597.66    609.38    605.67    605.67       .91 US
 52 4 R   -2000.00   1996.09    8469       0       0    968.75    996.09    988.64    988.64      1.34 US
 53 3 P   -2000.00   1996.09    2000       0       0    773.44    785.16    781.37    781.37      1.26 US
 58 3 P   -2000.00   1996.09    2000       0       0   -246.09     82.03     64.12     71.05     30.61 US
 59 4 R   -2000.00   1996.09    8469       0       0     66.41    250.00    227.73    229.04     24.45 US
 60 4 R   -2000.00   1996.09    8469       0       0    972.66    996.09    988.68    988.68      1.38 US
 63 3 P   -2000.00   1996.09    2000       0       0   -175.78    -74.22    -85.39     85.80      8.37 US
 65 4 R    -101.56    101.56    8469       0       0    -27.34     23.44      -.04     19.02     19.03 US
 66 3 P   -2000.00   1996.09    2000       0       0   1925.78   1996.09   1995.23   1995.24      4.27 US
 69 4 R    -101.56    101.56    8469       0       0    -39.06     35.16      3.05     12.11     11.72 US
 71 3 P   -2000.00   1996.09    2000       0       0    554.69   1996.09   1320.80   1427.29    541.10 US
 72 4 R    -101.56    101.56    8469    6101       0  -2000.00     15.63   -855.34   1136.97    749.10 US
 75 3 P   -2000.00   1996.09    2000       0       0  -2000.00    453.13   -722.55   1069.95    789.31 US
 77 4 R    -101.56    101.56    8469       0       0    -39.06     35.16      3.26     12.31     11.87 US
 78 3 P    -101.56    101.56    2000    1340       0  -2000.00    -15.63  -1057.23   1328.45    804.60 US
 79 4 R    -101.56    101.56    8469       0    8469    550.78   1996.09   1316.39   1423.54    541.87 US
 82 3 P    -101.56    101.56    2000       0       3    -54.69    378.91     -9.99     28.54     26.74 US
 85 3 P    -101.56    101.56    2000       0      12    -78.13    238.28    -40.18     45.72     21.82 US
 88 4 R    -101.56    101.56    8469       0       0    -89.84     82.03     -1.62     24.04     23.98 US
 90 4 R    -101.56    101.56    8469       0       3    -62.50    132.81    -13.32     28.06     24.69 US
 91 3 P    -101.56    101.56    2000    1703       0   -265.63    -27.34   -110.91    112.35     17.95 US
 92 4 R    -101.56    101.56    8469       0       0     -7.81     66.41      5.63      8.02      5.70 US
 93 4 R    -101.56    101.56    8469       2      38   -109.38    226.56    -42.58     46.78     19.36 US
 94 3 P    -101.56    101.56    2000     348       0   -261.72    -93.75   -105.64    106.81     15.81 US
 96 4 R    -101.56    101.56    8469       0      19      0.00    187.50     30.38     31.98      9.99 US
 97 3 P    -101.56    101.56    2000       0      32     62.50    265.63     93.47     93.69      6.50 US
100 4 R    -101.56    101.56    8469       0    8469    234.38    339.84    250.43    250.53      7.00 US
102 3 P    -101.56    101.56    2000       0       0      0.00     42.97     35.90     36.12      3.98 US
104 4 R    -101.56    101.56    8469       0      22      0.00    171.88     30.52     32.09      9.92 US
105 3 P    -101.56    101.56    2000       0       9     42.97    144.53     89.73     89.88      5.19 US
106 4 R    -101.56    101.56    8469       0       0     15.63     89.84     22.94     23.28      4.00 US
108 4 R    -101.56    101.56    8469       0    8469    234.38    343.75    250.47    250.57      7.02 US
109 3 P    -101.56    101.56    2000     698       0   -289.06    -35.16   -142.18    175.08    102.18 US
110 4 R   -2000.00   1996.09    8469       0       0    -42.97     42.97     32.87     33.49      6.41 US
112 3 P    -101.56    101.56    2000       0      11     -7.81    414.06      8.35     19.60     17.74 US
115 4 R    -101.56    101.56    8469       0       0    -46.88     58.59    -27.57     27.88      4.20 US
116 3 P    -101.56    101.56    2000       0      33      7.81    703.12     41.07     48.14     25.13 US
117 4 R    -101.56    101.56    8469       0       0     19.53     82.03     31.59     31.65      1.88 US
118 4 R    -101.56    101.56    8469       0      10    -11.72    179.69     14.13     16.03      7.58 US
120 3 P    -101.56    101.56    1991       0       5    -11.72    226.56      4.09     13.00     12.34 US
123 4 R    -101.56    101.56    8469       0       0    -46.88     58.59    -27.61     27.92      4.20 US
124 3 P    -101.56    101.56    1811       0      13    -19.53    304.69     34.52     37.20     13.85 US
126 3 P    -101.56    101.56    1680       0       5      3.91    195.31     28.27     30.11     10.36 US
127 4 R   -2000.00   1996.09    8469       0       0  -1800.78  -1796.88  -1796.88   1796.88       .17 US
129 3 P    -101.56    101.56    1644       0       0    -54.69     35.16      1.26     29.26     29.24 US
132 4 R   -2000.00   1996.09    8469       0       0      7.81     15.63     15.54     15.55       .57 US
133 3 P    -101.56    101.56    1420       6       2   -148.44    199.22    -20.33     26.01     16.22 US
134 4 R    -101.56    101.56    8469       0       0    -89.84     23.44     -8.44     22.92     21.31 US
135 3 P    -101.56    101.56     194       0       1    -50.78    281.25      5.42     33.57     33.22 US
137 4 R    -101.56    101.56    8468       0       0    -62.50     31.25     -1.38     29.22     29.19 US
139 3 P    -101.56    101.56      11       1       0   -121.09    -89.84    -92.68     93.12      9.42 US
140 4 R    -101.56    101.56    8468       0       0      3.91     27.34     16.02     17.03      5.78 US
~~145 4 R    -101.56    101.56    8468    3618      84    222.66    593.75     76.20    114.10     84.94 US~~
153 4 R    -101.56    101.56    8468    3615      36   -222.66    593.75    -76.78    114.39     84.81 US
162 4 R    -101.56    101.56    8468       0      16    -31.25    156.25      6.32     10.61      8.53 US
166 4 R    -101.56    101.56    8468       0       0    -54.69     19.53    -15.67     29.16     24.37 US
169 4 R   -2000.00   1996.09    8468       0       0      0.00     15.63      4.74      6.70      4.74 US
173 4 R    -101.56    101.56    8468       0       0      0.00     11.72      4.51      4.72      1.42 US
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VOYAGE RECORDS

INDEX Nº 79-2-4.6
YR.-VOYAGE-TAPE FILE

DATE	29th July 1979	RECORDING TIME 1915:43 TO 1921:03 GMT ELAPSED TIME 00 H 05 M 20 S
CONTRACTOR :	German & Milne Inc.	FINAL REPORT Nº 2627 TP
LOCATION	Admiralty Inlet	LAT : 73 ° 17 'N LONG : 85 ° 16 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.8 M AFT: 11.3 M
CARGO ☒ BALLAST ☐
BUBBLER ON ☐ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE				COMMENTS
ICE THICKNESS	CM		*			90	180	Compact pack ice
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS		*	5	5	10		
SNOW COVER	CM							
FLEXURAL STRENGTH	KPa							
COMPRESSIVE STRENGTH	MPa							
FRICTION								
PRESSURE	MPa							
RIDGES								
CRYSTAL								
SALINITY	%							

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis S. St. Laurent
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE: Determine structural response to ice breaking
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis. Alarms set to record impact >50 με

RECORDING NOTES
MODE: RECORDING ☐ STANDBY ☒
INTERVAL= 30 SECS
TAPE INFO: HEADER ☒ EOF ☒
OMIT CHANNELS: 41,66,75,110,127
(SEE APPENDIX A)

VIDEO RECORDING - TAPE Nº:
TIME : TO GMT
PHOTOS = -
# TO

COMMENTS: Actual gauge readings, in Microstrains, are equal to one-half the values on the printout. See Appendix A.

```
LAST TIME 79Y  7M 29D 19H 21M  3S
   627 TAPE RECORDS READ.
TYPE STATISTICS?                        TAPE 4 FILE 6
? AL
ADR R/M   MIN.AL   MAX.AL   #REC   #<MIN   #>MAX      MIN      MAX     MEAN      RMS       SD
  1 3 P   -24.50    24.45   2927       0       0      .53     3.64     1.15     1.17      .19 M/S.S
  2 3 P   -24.50    24.45   2927       0       0    -2.06     -.77    -1.15     1.15      .12 M/S.S
 31 3 P   -24.50    24.45   2927       0       0    -2.15    -1.44    -1.52     1.52      .13 M/S.S
 34 4 R  -101.56   101.56  12377       0       2   -58.59   125.00    -5.11     9.32     7.80 US
 35 3 P  -101.56   101.56   2927       0       1   -74.22   164.06     -.41    24.73    24.73 US
 36 4 R  -101.56   101.56  12377       0      88   -19.53   300.78    37.82    42.08    18.44 US
 38 3 P  -101.56   101.56   2927       0       8   -35.16   171.88    15.63    26.03    20.82 US
 39 4 R  -101.56   101.56  12377       0       0  -101.56    15.63    -6.93    16.47    14.95 US
 40 3 P  -101.56   101.56   2927     347    2560 -2000.00  1542.97   900.97  1420.95  1098.98 US
 41 4 R  -101.56   101.56  12377       0   12377  1996.09  1996.09  1996.09  1996.09     0.00 US
 42 3 P  -101.56   101.56   2924       0       1   -42.97   128.91    -3.33     9.06     8.43 US
 43 4 R  -101.56   101.56  12377       0       3   -85.94   152.34    -3.73    25.21    24.93 US
 46 3 P  -101.56   101.56   2924       1       5 -2000.00   160.16    13.88    44.68    42.48 US
 48 4 R -2000.00  1996.09  12377       0       0   585.94   640.63   608.45   608.46     2.23 US
 52 4 R -2000.00  1996.09  12377       0       0   890.63  1000.00   989.04   989.05     4.00 US
 53 3 P -2000.00  1996.09   2923       0       0   738.28   789.06   782.30   782.31     2.70 US
 58 3 P -2000.00  1996.09   2923       0       0  -246.09    82.03    62.61    69.64    30.50 US
 59 4 R -2000.00  1996.09  12377       0       0    66.41   250.00   227.66   228.94    24.21 US
 60 4 R -2000.00  1996.09  12377       0       0   886.72  1000.00   988.89   988.90     3.94 US
 63 3 P -2000.00  1996.09   2923       0       0  -183.59   -74.22   -85.64    85.96     7.44 US
 65 4 R  -101.56   101.56  12377       0       0   -19.53    42.97    14.19    25.68    21.40 US
 66 3 P -2000.00  1996.09   2923       0       0  1304.69  1996.09  1860.67  1871.23   198.60 US
 69 4 R  -101.56   101.56  12377       0       0   -97.66    82.03    -1.67     9.22     9.06 US
 71 3 P -2000.00  1996.09   2923       0       0   441.41  1996.09  1548.88  1628.99   504.65 US
 72 4 R  -101.56   101.56  12377   10008       0 -2000.00    19.53 -1276.12  1468.41   726.48 US
 75 3 P -2000.00  1996.09   2923       0       0 -2000.00   445.31 -1147.50  1360.98   731.91 US
 77 4 R  -101.56   101.56  12377       0       0   -97.66    82.03    -1.37     9.34     9.24 US
 78 3 P  -101.56   101.56   2923    2593       0 -2000.00    -7.81 -1446.99  1604.43   693.23 US
 79 4 R  -101.56   101.56  12377       0   12377   441.41  1996.09  1543.34  1623.87   505.05 US
 82 3 P  -101.56   101.56   2923       0       7   -62.50   414.06    -5.30    32.02    31.58 US
 85 3 P  -101.56   101.56   2923     194      15  -167.97   441.41   -33.39    54.39    42.94 US
 88 4 R  -101.56   101.56  12377      10       3  -132.81   214.84   -21.12    33.32    25.77 US
 90 4 R  -101.56   101.56  12377       0       0   -74.22   101.56    -8.68    31.30    30.07 US
 91 3 P  -101.56   101.56   2923    1446       0  -199.22    23.44  -107.94   109.50    18.41 US
 92 4 R  -101.56   101.56  12377       0       0   -11.72    31.25     7.56     9.78     6.20 US
 93 4 R  -101.56   101.56  12377    1117      31  -183.59   156.25   -37.29    55.28    40.81 US
 94 3 P  -101.56   101.56   2923    1832       0  -261.72   -97.66  -113.33   114.35    15.26 US
 96 4 R  -101.56   101.56  12377       0     452   -46.88   582.03    70.38    75.24    27.97 US
 97 3 P  -101.56   101.56   2923       0      53   -42.97   585.94    89.17    90.39    14.76 US
100 4 R  -101.56   101.56  12377       0   12377   144.53   632.81   253.80   254.71    21.49 US
102 3 P  -101.56   101.56   2923       0       0   -27.34    66.41    31.98    32.56     6.12 US
104 4 R  -101.56   101.56  12377       0     449   -46.88   589.84    70.46    75.81    27.99 US
105 3 P  -101.56   101.56   2923       0      20   -82.03   210.94    84.31    85.24    12.56 US
106 4 R  -101.56   101.56  12377       0      84     0.00   195.31    34.88    36.86    11.91 US
108 4 R  -101.56   101.56  12377       0   12377   144.53   636.72   253.93   254.84    21.55 US
109 3 P  -101.56   101.56   2923    1122       0  -285.16   -35.16  -150.34   182.49   103.45 US
110 4 R -2000.00  1996.09  12377       0       0   -74.22    50.78    28.00    29.12     8.00 US
112 3 P  -101.56   101.56   2923       0      61   -50.78   542.97    11.27    38.29    36.59 US
115 4 R  -101.56   101.56  12377       0      14   -82.03   218.75   -25.68    28.19    11.62 US
116 3 P  -101.56   101.56   2923       0      77   -19.53   765.63    44.01    57.97    37.73 US
117 4 R  -101.56   101.56  12377       0       8    15.63   289.06    43.19    43.68     6.54 US
118 4 R  -101.56   101.56  12377       0      59   -58.59   226.56    14.44    19.64    13.30 US
120 3 P  -101.56   101.56   2917       0      38   -74.22   500.00     4.84    29.18    28.78 US
123 4 R  -101.56   101.56  12377       0      14   -82.03   214.84   -25.69    28.17    11.57 US
124 3 P  -101.56   101.56   2632       0      32   -74.22   656.25    16.34    44.10    25.00 US
126 3 P  -101.56   101.56   2429       0      25   -27.34   332.03    29.39    34.08    17.27 US
127 4 R -2000.00  1996.09  12377       0       0 -1800.78 -1796.88 -1796.88  1796.88      .13 US
129 3 P  -101.56   101.56   2398       0       0   -54.69    46.88     2.30    26.52    26.42 US
132 4 R -2000.00  1996.09  12377       0       0     7.81    19.53    15.56    15.57      .54 US
133 3 P  -101.56   101.56   2139       3       0  -128.91    78.13    -2.53    19.93    19.77 US
134 4 R  -101.56   101.56  12377       0       0   -78.13    23.44   -14.26    24.37    19.76 US
135 3 P  -101.56   101.56    192       0      19   -27.34   621.09    34.93    92.84    86.24 US
137 4 R  -101.56   101.56  12377       0       0   -74.22    42.97     -.97    26.17    26.15 US
140 4 R  -101.56   101.56  12377       0       0     3.91    31.25    16.27    17.16     5.44 US
145 4 R  -101.56   101.56  12377    2881     583  -218.75   601.56    10.95   102.56   101.98 US
153 4 R  -101.56   101.56  12377    2883     580  -218.75   605.47    10.66   102.59   102.04 US
162 4 R  -101.56   101.56  12377       2       8  -136.72   144.53     8.57    13.35    10.30 US
164 4 R  -101.56   101.56  12377       0       0   -50.78    50.78     6.09    26.37    25.66 US
169 4 R -2000.00  1996.09  12377       0       0    -3.91    19.53     9.36    10.39     4.96 US
173 4 R  -101.56   101.56  12377       0       0    -3.91    15.63     5.33     5.67     1.90 US
```

VOYAGE RECORDS

INDEX Nº 79-2-4.7
YR.-VOYAGE-TAPE FILE

DATE 29th July 1979
RECORDING TIME 1943:47 TO 1945:40 GMT
ELAPSED TIME 00 H 01 M 53 S

CONTRACTOR : German & Milne Inc.
FINAL REPORT Nº 2627 TP

LOCATION Admiralty Inlet
LAT : 73 ° 17 'N
LONG : 85 ° 16 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.8 M
AFT: 11.3 M
CARGO ☒
BALLAST ☐
BUBBLER ON ☐ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	90 180	
ICE COVER 1Y 2Y+MY TOT	TENTHS		*	5 5 10	Compact pack ice
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				Ship Stationary

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis S. St. Laurent
FOLLOWING ☒
IN ATTENDANCE ☐ Ship stationary

RATIONALE
REASON FOR TAPE Determine structural response, if any, while ship stationary
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis. Alarms set to record impacts >50 με

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☒
INTERVAL= 30 SECS
TAPE INFO HEADER ☒
EOF ☒
OMIT CHANNELS: (SEE APPENDIX A) 41,66,75,110,127

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS Actual gauge readings, in Microstrains, are equal to one-half the values on the printout. See Appendix A.

```
LAST TIME 79Y  7M 29D 19H 45M 40S
   220 TAPE RECORDS READ.
TYPE STATISTICS?                    TAPE 4  FILE 7
? AL
ADR R/M    MIN.AL     MAX.AL    #REC   #<MIN    #>MAX      MIN      MAX     MEAN      RMS       SD
  1 3 P    -24.50      24.45    1027       0        0      .86     3.44      .94      .95      .09 M/S.S
  2 3 P    -24.50      24.45    1027       0        0    -2.06     -.86    -1.18     1.18      .11 M/S.S
 31 3 P    -24.50      24.45    1027       0        0    -2.15    -1.44    -1.52     1.53      .14 M/S.S
 34 4 R   -101.56     101.56    4342       0        0   -15.63     7.81    -4.90     8.51     6.96 US
 35 3 P   -101.56     101.56    1027       0        0   -31.25    23.44    -7.76    23.07    21.74 US
 36 4 R   -101.56     101.56    4342       0        7     3.91    58.59    39.65    42.38    14.96 US
 38 3 P   -101.56     101.56    1027       0        1   -31.25   246.09     3.41    32.49    32.32 US
 39 4 R   -101.56     101.56    4342       0        0   -27.34     7.81   -23.70    24.04     4.06 US
 40 3 P   -101.56     101.56    1027       0     1027  1285.16  1496.09  1313.99  1314.51    36.90 US
 41 4 R   -101.56     101.56    4342       0     4342  1996.09  1996.09  1996.09  1996.09     0.00 US
 42 3 P   -101.56     101.56    1026       0        0   -11.72    70.31    -3.95     8.50     7.53 US
 43 4 R   -101.56     101.56    4342       0        0   -35.16    15.63   -10.99    24.28    21.66 US
 46 3 P   -101.56     101.56    1026       0        0   -35.16    35.16     3.21    32.79    32.64 US
 48 4 R  -2000.00    1996.09    4342       0        0   605.47   613.28   607.91   607.91     1.89 US
 52 4 R  -2000.00    1996.09    4342       0        0   988.28   992.19   989.10   989.10     1.39 US
 53 3 P  -2000.00    1996.09    1025       0        0   777.34   785.16   781.31   781.31      .69 US
 58 3 P  -2000.00    1996.09    1025       0        0  -132.81    82.03    62.36    69.16    29.91 US
 59 4 R  -2000.00    1996.09    4342       0        0    74.22   250.00   227.00   228.45    25.70 US
 60 4 R  -2000.00    1996.09    4342       0        0   988.28   992.19   988.91   988.91     1.44 US
 63 3 P  -2000.00    1996.09    1025       0        0  -171.88   -74.22   -85.42    85.89     8.98 US
 65 4 R   -101.56     101.56    4342       0        0   -11.72    15.63    -2.60     3.84     3.23 US
 66 3 P  -2000.00    1996.09    1025       0        0  1519.53  1996.09  1850.48  1855.52   136.69 US
 69 4 R   -101.56     101.56    4342       0        0   -23.44     7.81    -9.27    15.92    12.94 US
 71 3 P  -2000.00    1996.09    1025       0        0  1652.34  1996.09  1811.25  1819.13   169.18 US
 72 4 R   -101.56     101.56    4342    4340        0 -2000.00     0.00 -1040.74  1054.91   172.39 US
 75 3 P  -2000.00    1996.09    1025       0        0 -2000.00  -218.75  -722.19   857.28   462.00 US
 77 4 R   -101.56     101.56    4342       0        0   -27.34     7.81    -8.54    17.03    14.74 US
 78 3 P   -101.56     101.56    1025    1025        0 -1843.75 -1070.31 -1320.28  1338.25   218.67 US
 79 4 R   -101.56     101.56    4342       0     4342   875.00  1996.09  1802.55  1811.25   177.31 US
 82 3 P   -101.56     101.56    1025       0        1   -19.53   332.03   -13.66    18.21    12.04 US
 85 3 P   -101.56     101.56    1025       0        1   -62.50   226.56   -32.29    45.35    31.85 US
 88 4 R   -101.56     101.56    4342       0        0   -50.78    42.97   -14.38    36.28    33.31 US
 90 4 R   -101.56     101.56    4342       0        0   -23.44     0.00   -15.52    16.20     4.66 US
 91 3 P   -101.56     101.56    1025     620        0  -183.59   -27.34  -109.14   110.38    16.47 US
 92 4 R   -101.56     101.56    4342       0        0     0.00    15.63     4.30     4.47     1.22 US
 93 4 R   -101.56     101.56    4342       0        0   -66.41     3.91   -33.41    45.33    30.65 US
 94 3 P   -101.56     101.56    1025     594        0  -261.72   -97.66  -112.35   113.57    16.57 US
 96 4 R   -101.56      .01.56    4342       0        0    54.69    93.75    69.06    69.13     3.11 US
 97 3 P   -101.56      .01.56    1025       0        1    74.22   316.41    87.56    87.89     7.65 US
100 4 R   -101.56     101.56    4342       0     4342   253.91   265.63   257.22   257.24     2.74 US
102 3 P   -101.56     101.56    1025       0        0     3.91    50.78    28.05    28.21     2.96 US
104 4 R   -101.56     101.56    4342       0        0    54.69    93.75    68.62    68.69     3.14 US
105 3 P   -101.56     101.56    1025       0        0    70.31    93.75    84.21    84.26     2.84 US
106 4 R   -101.56     101.56    4342       0        0    23.44    42.97    33.64    33.71     2.16 US
108 4 R   -101.56     101.56    4342       0     4342   253.91   269.53   257.35   257.36     2.77 US
109 3 P   -101.56     101.56    1025     474        0  -285.16   -66.41  -167.50   198.60   106.74 US
110 4 R  -2000.00    1996.09    4342       0        0     3.91    31.25    26.38    26.54     2.88 US
112 3 P   -101.56     101.56    1025       0        1     3.91   519.53     5.62    17.15    16.21 US
115 4 R   -101.56     101.56    4342       0        0   -35.16   -27.34   -27.80    27.83     1.34 US
116 3 P   -101.56     101.56    1025       0        1    27.34   667.97    36.52    41.60    19.91 US
117 4 R   -101.56     101.56    4342       0        0    39.06    42.97    41.39    41.43     1.92 US
118 4 R   -101.56     101.56    4342       0        0    15.63    27.34    16.64    16.73     1.75 US
120 3 P   -101.56     101.56    1019       0        0     0.00    11.72     4.22     4.51     1.59 US
123 4 R   -101.56     101.56    4342       0        0   -35.16   -27.34   -27.77    27.80     1.31 US
124 3 P   -101.56     101.56     914       0        0    23.44    50.78    33.66    33.75     2.47 US
126 3 P   -101.56     101.56     849       0        1    27.34   253.91    31.38    32.32     7.73 US
127 4 R  -2000.00    1996.09    4342       0        0 -1800.78 -1796.88 -1796.88  1796.88      .16 US
129 3 P   -101.56     101.56     843       0        0   -39.06    58.59     7.12    46.13    45.61 US
132 4 R  -2000.00    1996.09    4342       0        0     7.81    19.53    15.34    15.55      .59 US
133 3 P   -101.56     101.56     665       0        1   -93.75   140.63     6.92    29.43    28.62 US
134 4 R   -101.56     101.56    4342       0        0   -27.34     3.91    -9.47    13.46     9.57 US
135 3 P   -101.56     101.56      63       0        1    11.72   316.41    16.56    41.52    38.39 US
137 4 R   -101.56     101.56    4342       0        0   -42.97    34.69     4.03    44.96    44.79 US
139 3 P   -101.56     101.56       2       0        0   -89.84   -89.84   -89.84    89.84     0.00 US
140 4 R   -101.56     101.56    4342       0        0     7.81    27.34    17.45    19.67     9.00 US
145 4 R   -101.56     101.56    4342    2327        0  -226.56    78.13  -103.48   162.77   125.49 US
153 4 R   -101.56     101.56    4342    2328        0  -226.56    78.13  -103.84   163.10   125.78 US
162 4 R   -101.56     101.56    4342       0        0   -15.63    35.16     8.41     9.32     4.46 US
164 4 R   -101.56     101.56    4342       0        0   -42.97    11.72   -13.95    27.30    23.47 US
169 4 R  -2000.00    1996.09    4342       0        0     0.00    15.63     6.24     8.11     3.19 US
173 4 R   -101.56     101.56    4342       0        0     0.00    11.72     4.48     4.69     1.39 US
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VOYAGE RECORDS

INDEX Nº 79-2-4.8
YR. – VOYAGE – TAPE FILE

DATE	29th July 1979	RECORDING TIME 2053:55 TO 2122:00 GMT	ELAPSED TIME 00 H 28 M 05 S
CONTRACTOR :	German & Milne Inc.	FINAL REPORT Nº 2627 TP	
LOCATION	Admiralty Inlet	LAT : 73 ° 17 'N	LONG : 85 ° 16 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.8 M
AFT: 11.3 M
CARGO ☒
BALLAST ☐
BUBBLER ON ☐ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM		*			90			180	Compact pack ice
ICE COVER 1Y 2Y+MY TOT	TENTHS		*	5	5	10				
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis S. St. Laurent
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE Determine structural response to ice breaking
Collect broad range of data for possible future analysis.

REASON FOR SAMPLING PATTERN: Alarms set to record impacts >50 µε

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☒
TAPE INFO · HEADER ☒
INTERVAL= 30 SECS
EOF ☐
OMIT CHANNELS: (SEE APPENDIX A) 41,66,75,110,127

VIDEO RECORDING –
TIME : TO GMT
TAPE Nº:
PHOTOS = –
# TO

COMMENTS Actual gauge readings, in Microstrains, are equal to one-half the values on the Printout. See Appendix A.

```
LAST TIME 79Y  7M 29D 21H 22M  0S
END TIME  79Y  7M 29D 21H 22M  0S
THIS TIME 79Y  7M 29D 21H 22M  1S
  3370 TAPE RECORDS READ.
TYPE STATISTICS?
? AL                              Tape 4 File 8
ADR R/M    MIN.AL    MAX.AL    #REC    #<MIN    #>MAX
  1 3 P    -24.50     24.45   15726                         MIN       MAX      MEAN       RMS       SD
  2 3 P    -24.50     24.45   15726        0        0       .42      4.50      1.12      1.14      .20 M/S.S
 31 3 P    -24.50     24.45   15726        0        0     -2.06      -.67     -1.15      1.16      .12 M/S.S
 34 4 R   -101.56    101.56   66529        0        0     -2.49     -1.44     -1.55      1.55      .14 M/S.S
 35 3 P   -101.56    101.56   15726        0        9   -101.56    292.97     -6.41      9.80     7.41 US
 36 4 R   -101.56    101.56   66529        0        9    -70.31    410.16      8.48     27.51    26.17 US
 38 3 P   -101.56    101.56   15726        0       84    -54.69    476.56     12.65     28.59    25.64 US
 39 4 R   -101.56    101.56   66529        0       14    -58.59    226.56      3.04     28.88    28.64 US
 40 3 P   -101.56    101.56   15724       12        0   -203.13     42.97     -2.91     26.35    26.19 US
 41 4 R   -101.56    101.56   66529      179    15545  -2000.00   1527.34   1275.48   1323.46   353.17 US
 42 3 P   -101.56    101.56   15699        0    66529   1996.09   1996.09   1996.09   1996.09     0.00 US
 43 4 R   -101.56    101.56   66529        0        7    -97.66    675.78     -4.60     10.69     9.65 US
 46 3 P   -101.56    101.56   15699        0       26    -89.84    382.81      5.36     26.33    25.78 US
 48 4 R  -2000.00   1996.09   66529      110        8  -2000.00    175.78    -12.24    169.79   169.36 US
 52 4 R  -2000.00   1996.09   66529        0        0    566.41    902.34    611.46    611.47     3.90 US
 53 3 P  -2000.00   1996.09   15699        0        0    859.38   1035.16    976.51    976.53     7.01 US
 58 3 P  -2000.00   1996.09   15699        0        0    726.56    832.03    772.88    772.90     5.29 US
 59 4 R  -2000.00   1996.09   66529        0        0   -246.09     82.03     62.81     67.18    23.82 US
 60 4 R  -2000.00   1996.09   66529        0        0     66.41    250.00    224.26    225.60    24.55 US
 63 3 P  -2000.00   1996.09   15699        0        0    863.28   1035.16    976.55    976.57     6.93 US
 65 4 R   -101.56    101.56   66529        0        0   -103.59    -74.22    -85.20     85.41     5.98 US
 66 3 P  -2000.00   1996.09   15699        0        0    -31.25     54.69      1.01     10.49    10.44 US
 69 4 R   -101.56    101.56   66529        0        0   1234.38   1996.09   1850.93   1862.37   206.06 US
 71 3 P  -2000.00   1996.09   15699        0       19    -89.84    234.38      -.44      9.41     9.40 US
 72 4 R   -101.56    101.56   66529        0        0    363.28   1996.09   1340.23   1451.87   558.32 US
 75 3 P  -2000.00   1996.09   15699    56860        0  -2000.00     74.22  -1234.03   1440.06   742.23 US
 77 4 R   -101.56    101.56   66529        0        0  -2000.00    449.22  -1111.52   1385.41   827.00 US
 78 3 P   -101.56    101.56   15699        0       19    -97.66    242.19      -.24      9.41     9.40 US
 79 4 R   -101.56    101.56   66529    14287        0  -2000.00    -15.63  -1370.14   1548.41   705.93 US
 82 3 P   -101.56    101.56   15699        0    66529    351.56   1996.09   1334.20   1446.77   559.33 US
 85 3 P   -101.56    101.56   15699        0       31    -66.41    558.59      4.46     20.71    20.22 US
 88 4 R   -101.56    101.56   66529       10       85   -167.97    957.03    -25.78     41.84    32.95 US
 90 4 R   -101.56    101.56   66529       35       33   -214.84    664.06    -15.55     30.80    26.59 US
 91 3 P   -101.56    101.56   15699        7       39  -1996.09    464.84      1.12     19.37    19.33 US
 92 4 R   -101.56    101.56   66529     9448        1   -210.94    136.72   -107.36    108.81    17.74 US
 93 4 R   -101.56    101.56   66529        0        6    -15.63    140.63      8.90     10.12     4.80 US
 94 3 P   -101.56    101.56   15699      118      257   -238.28    832.03    -29.32     41.88    29.91 US
 96 4 R   -101.56    101.56   66529     7873        0   -261.72    -58.59   -110.83    112.09    16.74 US
 97 3 P   -101.56    101.56   15699        3     2756   -164.06    929.69     86.57     89.88    24.16 US
100 4 R   -101.56    101.56   66529        0      262    -85.94    406.25     85.60     86.60    13.11 US
102 3 P   -101.56    101.56   15699        0    66526     85.94    816.41    264.47    265.04    17.39 US
104 4 R   -101.56    101.56   66529        7        0   -132.81     50.78     18.33     19.96     7.90 US
105 3 P   -101.56    101.56   15699        2     2748   -164.06    957.03     86.74     90.04    24.14 US
106 4 R   -101.56    101.56   66529        5       88   -199.22    378.91     81.03     81.92    12.05 US
108 4 R   -101.56    101.56   66529        0      293    -11.72    289.06     39.47     40.90    10.70 US
109 3 P   -101.56    101.56   15699        0    66526     85.94    828.13    264.71    265.28    17.38 US
110 4 R  -2000.00   1996.09   66529     6573        0   -289.06      7.81   -158.38    189.85   104.68 US
112 3 P   -101.56    101.56   15699        0        0   -207.03     46.88     14.39     17.80    10.49 US
113 4 R   -101.56    101.56   66529        1      186   -125.00    878.91      8.14     31.60    30.53 US
114 3 P   -101.56    101.56   15699        2       43   -117.19    347.66     21.66     23.23     8.38 US
117 4 R   -101.56    101.56   66529        0      472    -35.16    832.03     57.47     65.22    30.83 US
118 4 R   -101.56    101.56   66529        0      139    -11.72    750.00     62.81     63.75    10.90 US
120 3 P   -101.56    101.56   15665        0      100    -93.75    498.19     11.94     16.00    11.93 US
123 4 R   -101.56    101.56   66529        3      115   -136.72    863.28      2.35     23.68    23.57 US
124 3 P   -101.56    101.56   13944        2       43   -117.19    351.56    -21.65     23.21     8.36 US
126 3 P   -101.56    101.56   12959        0      159    -97.66    613.28     49.56     53.20    19.32 US
127 4 R  -2000.00   1996.09   66529        0       93    -62.50    311.72     26.75     31.36    16.37 US
129 3 P   -101.56    101.56   12910        0        0  -1800.78  -1796.88  -1796.88   1796.88      .13 US
132 4 R  -2000.00   1996.09   66529        0        0    -58.59     85.94      8.90     34.07    32.89 US
133 3 P   -101.56    101.56   11348        0        0      7.81     23.44     15.47     15.49      .80 US
134 4 R   -101.56    101.56   66529       14        2   -179.69    156.25    -14.89     32.30    28.67 US
135 3 P   -101.56    101.56     863        6        0   -117.19     62.50     -8.87     27.99    26.55 US
137 4 R   -101.56    101.56   66529        0       39    -62.50   1371.09      5.71     85.87    85.73 US
139 3 P   -101.56    101.56      15        0        0    -66.41     82.03      5.38     33.47    33.03 US
140 4 R   -101.56    101.56   66528        0        0   -101.56    -97.66    -99.48     99.50     2.02 US
145 4 R   -101.56    101.56   66528        0        0      3.91     31.25     17.25     18.45     6.55 US
153 4 R   -101.56    101.56   66528    27799      833   -531.25    753.91    -61.33    151.38   138.53 US
162 4 R   -101.56    101.56   66528    27810      853   -765.63    757.81    -61.76    151.75   138.61 US
166 4 R   -101.56    101.56   66528       72       51   -320.31    187.50      -.28     20.45    20.45 US
169 4 R  -2000.00   1996.09   66528        0        0    -93.75     54.69     -5.63     29.26    28.72 US
173 4 R   -101.56    101.56   66528        0        0     -7.81     23.44      7.18      8.90     5.26 US
 CONTINUE?>>? NO                           0        0      0.00     15.63      4.93      3.22     1.73 US
ANSWER Y OR N >>? N
```

VOYAGE RECORDS

INDEX Nº 79-2-5.1
YR.-VOYAGE-TAPE FILE

DATE	29th August 1979
RECORDING TIME	2211:17 TO 2257:00 GMT
ELAPSED TIME	00 H 45 M 43 S
CONTRACTOR :	German & Milne Inc.
FINAL REPORT Nº	2627 TP
LOCATION	Admiralty Inlet
LAT :	73 ° 70 'N
LONG :	83 ° 50 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.8 M CARGO ☒ BUBBLER ON ☐
AFT: 11.3 M BALLAST ☐ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM									
ICE COVER 1Y | 2Y+MY | TOT	TENTHS		*			90 10			180	
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis S. St. Laurent
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE Determine structural response to ice breaking.

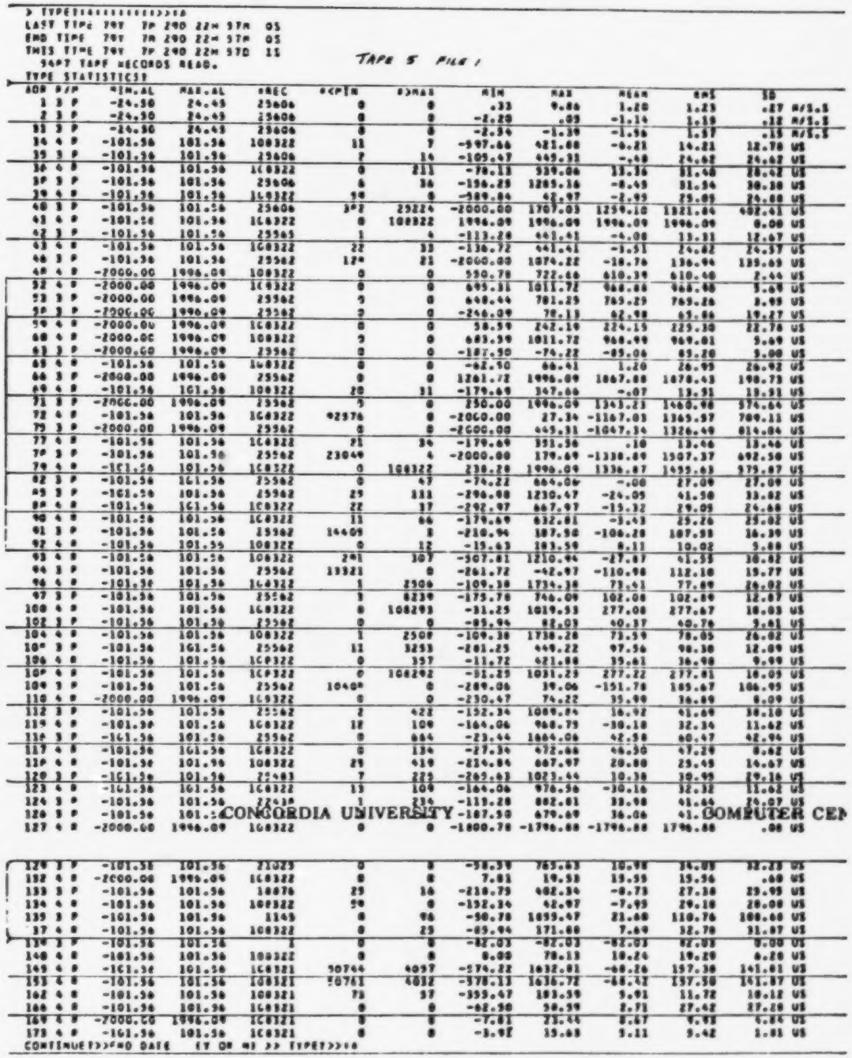
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis. Alarms set to record impacts >50 με

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☒ INTERVAL= 30 SECS
TAPE INFO HEADER ☒ EOF ☐
OMIT CHANNELS: (SEE APPENDIX A) 41,66,75,110,127,139

VIDEO RECORDING - TAPE Nº:
TIME : TO GMT
PHOTOS = -
# TO

COMMENTS Actual gauge readings, in Microstrains, are equal to one-half the values on the Printout. See Appendix A.


TAPE 5 FILE 1
CONCORDIA UNIVERSITY COMPUTER CEN

VOYAGE RECORDS

INDEX Nº 79-2-6.1
YR. – VOYAGE – TAPE FILE

DATE 1st August 1979
RECORDING TIME 0240:09 TO 0325:30 GMT
ELAPSED TIME 00 H 45 M 21 S

CONTRACTOR : German & Milne Inc.
FINAL REPORT Nº 2627 TP

LOCATION Davis Strait
LAT : 69 ° 41 'N
LONG : 57 ° 55 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.8 M
AFT: 11.3 M
CARGO ☒
BALLAST ☐
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				Open water
ICE COVER ☐ 1Y ☐ 2Y+MY ☐ TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				*
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE Determine structural response to random impacts in bergy water. Collect a broad range of data for possible future analysis.

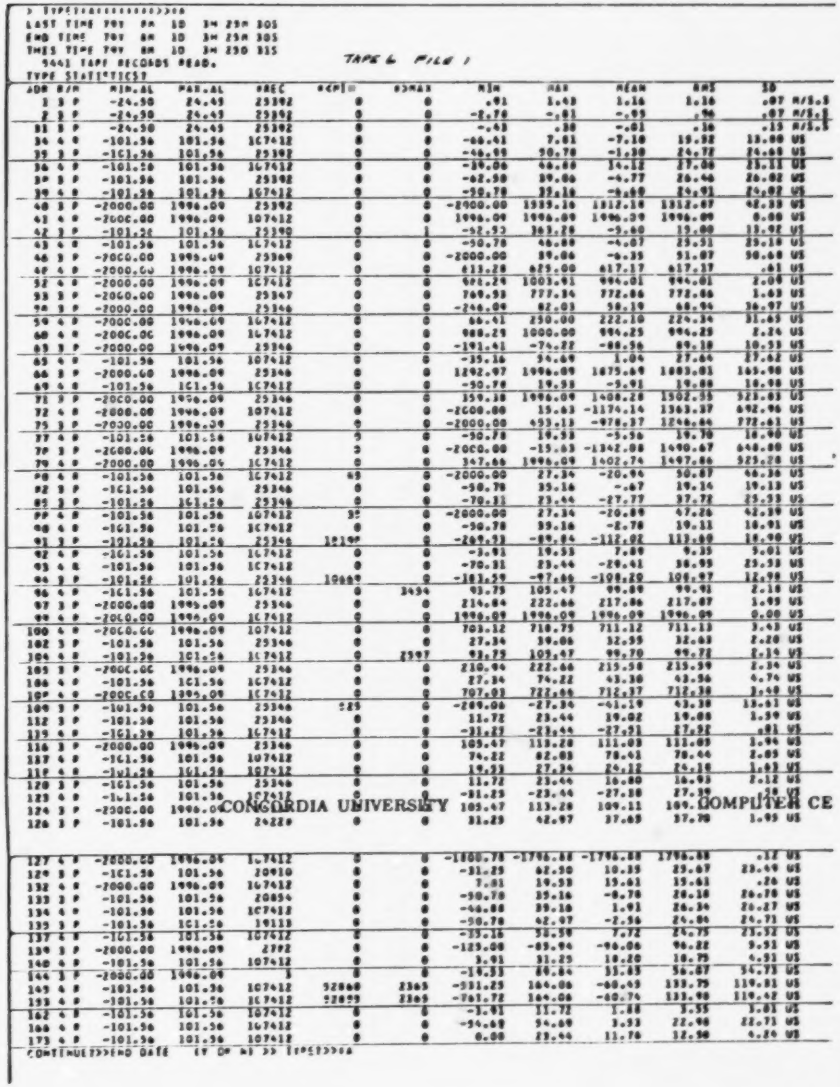
REASON FOR SAMPLING PATTERN: Alarms set to record impacts >50 με

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☒
INTERVAL= 30 SECS
TAPE INFO HEADER ☒
EOF ☐
OMIT CHANNELS: (SEE APPENDIX A) 41,66,75,99,110,127

VIDEO RECORDING -
TAPE Nº:
TIME : TO GMT
PHOTOS = -
# TO

COMMENTS Alarms on 42 S/G channels set to ±50 με. Due to very frequent alarms, tape records continuously. Actual gauge readings, in Microstrains, are equal to one-half the values on the Printout. See Appendix A.


TAPE 6 FILE 1
CONCORDIA UNIVERSITY COMPUTER CE

VOYAGE RECORDS

INDEX Nº 79-3-7.1
YR. – VOYAGE – TAPE FILE

DATE 17th August 1979
RECORDING TIME 0014:51 TO 0120:00 GMT
ELAPSED TIME 01 H 05 M 09 S

CONTRACTOR: German & Milne Inc.
FINAL REPORT Nº 2627 TP

LOCATION Off coast of Greenland
LAT: 59 ° 59 'N
LONG: 37 ° 22 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 5.74 M AFT: 7.84 M
CARGO ☐ BALLAST ☒
BUBBLER ON ☐ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				Numerous icebergs and growlers
ICE COVER IY [illegible] +MY TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				*
RAMMING				
ASTERN				
TURNING				

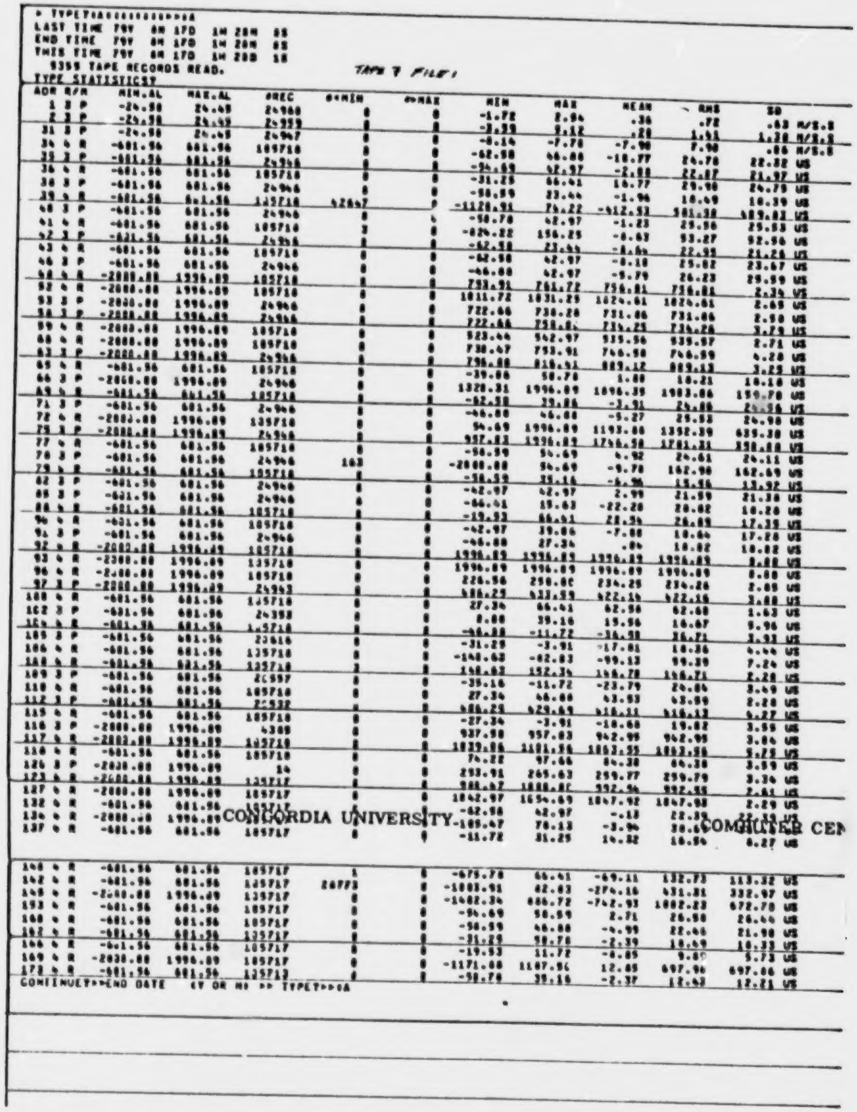
ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE Determine structural response to random impacts in bergy water.
REASON FOR SAMPLING PATTERN: Collect a broad range of data for possible future analysis. Alarms set to record impacts >300 με

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☒
INTERVAL= 30 SECS
TAPE INFO HEADER ☒
EOF ☐
OMIT CHANNELS: (SEE APPENDIX A) 66,75,92,93,110,127

VIDEO RECORDING - TAPE Nº:
TIME: TO GMT
PHOTOS = -
# TO

COMMENTS Actual gauge readings, in Microstrains, are equal to one-half the values on the printouts. See Appendix A.



```
> TYPETDA...........>>DA
LAST TIME 79Y 8M 17D 1H 20M 33
END TIME  79Y 8M 17D 1H 20M 03
THIS TIME 79Y 8M 17D 1H 20D 18
  9359 TAPE RECORDS READ.
TYPE STATISTICS?
ADR R/M   MIN.AL   MAX.AL   #REC   #<MIN   #>MAX   MIN   MAX   MEAN   RMS   SD
```

TAPE 7 FILE 1

CONCORDIA UNIVERSITY COMPUTER CEN

VOYAGE RECORDS

INDEX Nº 79-3-8.1
YR.-VOYAGE-TAPE FILE

DATE 20th August 1979
RECORDING TIME 1949:24 TO 1951:03 GMT
ELAPSED TIME 00 H 01 M 39 S

CONTRACTOR: German & Milne Inc.
FINAL REPORT Nº 2627 TP

LOCATION Baffin Bay
LAT: 72 ° 54 'N
LONG: 60 ° 17 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 5.74 M
AFT: 7.84 M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				Ice strip. Bergy bits and Tabular bergs.
ICE COVER 1Y 2Y+MY TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	*
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE Determine structural response to random impacts in bergy water.
REASON FOR SAMPLING PATTERN: Collect a broad range of data for possible future analysis.

RECORDING NOTES
MODE RECORDING ☒
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☒
EOF ☒
OMIT CHANNELS: (SEE APPENDIX A) 66,75,92,93,110,127

VIDEO RECORDING - TAPE Nº:
TIME: TO GMT
PHOTOS = 4
# 1 - 15 TO 1 - 18

COMMENTS All alarms triggered by S/G channel #142. Actual gauge readings in Microstrains, are equal to one-half the values on the printout. See Appendix A.

TAPE 8 FILE 1

```
EOF.
LAST TIME 79Y  8M 20D 19H 51M  3S
   187 TAPE RECORDS READ.
TYPE STATISTICS?
? AL
ADR R/M   MIN.AL   MAX.AL   #REC   #<MIN   #>MAX      MIN      MAX     MEAN      RMS       SD
  1 3 P   -24.50    24.45    873       0       0      .33      .96      .66      .67      .12 M/S.S
  2 3 P   -24.50    24.45    873       0       0     -.00     5.02     1.49     1.68      .78 M/S.S
 31 3 P   -24.50    24.45    873       0       0    -6.13    -6.08    -6.11     6.11      .02 M/S.S
 34 4 R  -601.56   601.56   3690       0       0   -19.53    27.34    15.23    19.66    12.43 US
 35 3 P  -601.56   601.56    873       0       0   -58.59    42.97     4.22    47.03    46.86 US
 36 4 R  -601.56   601.56   3690       0       0    -3.91    33.16    16.38    20.71    12.07 US
 38 3 P  -601.56   601.56    873       0       0   -27.34    27.34    -7.69    23.26    21.96 US
 39 4 R  -601.56   601.56   3690       0       0   -19.53    19.53    11.76    12.72     4.84 US
 40 3 P  -601.56   601.56    873       0       0     0.00    31.25     9.14     9.97     3.78 US
 41 4 R  -601.56   601.56   3690       0       0   -46.88    58.59    -7.64     9.51     5.67 US
 42 3 P  -601.56   601.56    873       0       0   -42.97    31.25   -37.26    37.62     5.17 US
 43 4 R  -601.56   601.56   3690       0       0   -19.53    27.34     9.91    16.21    12.82 US
 46 3 P  -601.56   601.56    873       0       0   -31.25     7.81   -10.04    16.94    13.65 US
 48 4 R -2000.00  1996.09   3690       0       0   343.75   347.66   343.99   343.99      .93 US
 55 3 P -2000.00  1996.09    872       0       0   316.41   339.84   323.33   323.38     4.58 US
 58 3 P -2000.00  1996.09    871       0       0   492.19   519.53   500.24   500.26     4.92 US
 59 4 R  -601.56  601.[illegible]  [illegible]  [illegible]  0   218.75   238.28   222.27  222.[illegible]  [illegible] US
 60 4 R -2000.00  1996.09   3690       0       0   324.22   339.84   333.24   333.27     4.02 US
 63 3 P -2000.00  1996.09    871       0       0   324.22   332.03   326.56   326.56     2.19 US
 65 4 R  -601.56   601.56   3690       0       0     0.00    11.72     7.00     8.24     4.35 US
 66 3 P -2000.00  1996.09    871       0       0  1273.44  1996.09  1798.01  1817.87   266.78 US
 69 4 R  -601.56   601.56   3690       0       0    -7.81    23.44    15.42    16.12     4.68 US
 71 3 P  -601.56   601.56    871       0       0   -19.53    23.44   -11.67    12.80     5.25 US
 72 4 R -2000.00  1996.09   3690       0       0   203.13  1996.09  1399.44  1468.90   446.42 US
 75 3 P -2000.00  1996.09    871       0       0  1972.66  1996.09  1994.63  1994.64     5.13 US
 77 4 R  -601.56   601.56   3690       0       0   -46.88    39.06   -13.72    41.42    39.09 US
 78 3 P  -601.56   601.56    871       0       0    19.53    35.16    30.06    30.47     5.00 US
 79 4 R  -601.56   601.56   3690       0       0    -7.81    39.06    29.84    30.16     4.38 US
 82 3 P  -601.56   601.56    871       0       0    19.53    35.16    24.85    24.92     1.91 US
 85 3 P  -601.56   601.56    871       0       0   -27.34   -11.72   -17.17    17.46     3.14 US
 88 4 R  -601.56   601.56   3690       0       0     7.81    42.97    32.33    33.57     9.07 US
 90 4 R  -601.56   601.56   3690       0       0   -15.63    23.44    17.81    17.95     2.27 US
 91 3 P  -601.56   601.56    871       0       0     3.91    11.72     5.29     5.81     1.89 US
 92 4 R -2000.00  1996.09   3690       0       0  1996.09  1996.09  1996.09  1996.09     0.00 US
 93 4 R -2000.00  1996.09   3690       0       0  1996.09  1996.09  1996.09  1996.09     0.00 US
 96 4 R  -601.56   601.56   3690       0       0   285.16   296.88   291.01   291.02     2.21 US
 97 3 P  -601.56   601.56    871       0       0   535.16   546.88   540.96   540.96     2.19 US
100 4 R  -601.56   601.56   3690       0       0    55.16    78.13    72.41    72.83     7.78 US
105 3 P  -601.56   601.56    871       0       0   -58.59   -50.78   -55.59    55.63     2.14 US
106 4 R  -601.56   601.56   3690       0       0  -167.97  -136.72  -152.86   152.96     5.54 US
108 4 R  -601.56   601.56   3690       0       0   117.19   125.00   119.58   119.60     2.39 US
109 3 P  -601.56   601.56    871       0       0   -31.25   -19.53   -26.63    26.68     1.66 US
110 4 R  -601.56   601.56   3690       0       0    27.34    42.97    38.00    38.05     1.92 US
112 3 P  -601.56   601.56    871       0       0   406.25   414.06   409.65   409.65     1.34 US
113 4 R  -601.56   601.56   3690       0       0    -7.81     3.91    -1.85     2.70     1.96 US
116 3 P -2000.00  1996.09    871       0       0  1179.69  1187.50  1181.67  1181.67     2.07 US
117 4 R -2000.00  1996.09   3690       0       0  1214.84  1246.09  1228.89  1228.90     5.96 US
118 4 R  -601.56   601.56   3690       0       0    58.59    66.41    62.47    62.47      .47 US
120 3 P  -601.56   601.56    871       0       0   253.91   257.81   254.74   254.75     1.60 US
123 4 R -2000.00  1996.09   3690       0       0  1035.16  1042.97  1037.34  1037.35     1.94 US
124 3 P -2000.00  1996.09    871       0       0  -234.38  -226.38  -230.03   230.04     1.24 US
127 4 R -2000.00  1996.09   3690       0       0  1027.34  1031.25  1029.01  1029.01     1.93 US
129 3 P -2000.00  1996.09    871       0       0    15.63    35.16    20.07    20.13     1.31 US
132 4 R  -601.56   601.56   3690       0       0   -15.63    35.16    21.77    23.70     9.37 US
133 3 P -2000.00  1996.09    871       0       0 -1308.59 -1253.91 -1291.61  1291.74    17.79 US
134 4 R  -601.56   601.56   3690       0       0   -42.97    15.63   -41.79    41.88     2.74 US
135 3 P -2000.00  1996.09    858       0       0   -46.88    15.63   -35.33    36.53     9.27 US
137 4 R  -601.56   601.56   3690       0       0     3.91    27.34     6.95     7.21     1.91 US
139 3 P -2000.00  1996.09    731       0       0   -15.63    15.63   -10.60    10.83     2.24 US
140 4 R  -601.56   601.56   3690       0       0  -103.59    11.72      .15     4.18     4.18 US
142 4 R  -601.56   601.56   3690       0       0  -472.66    54.69  -151.11   214.04   151.62 US
144 3 P -2000.00  1996.09    715       0       0   -19.53    46.88    20.18    35.82    29.62 US
145 4 R -2000.00  1996.09   3690       0       0  -941.41   265.63    38.78   299.11   296.80 US
147 3 P -2000.00  1996.09    711       0       0   -27.34    27.34    -8.94    23.73    22.00 US
153 4 R  -601.56   601.56   3690       0       0   -15.63    19.53    -2.44    13.34    13.12 US
158 3 P -2000.00  1996.09    216       0       0  1535.16  1996.09  1746.37  1761.13   228.11 US
160 4 R  -601.56   601.56   3690       0       0   -46.88    35.16   -14.81    34.95    31.66 US
162 4 R  -601.56   601.56   3690       0       0   -35.16    15.63   -30.02    30.28     3.95 US
166 4 R  -601.56   601.56   3690       0       0   -19.53    -3.91   -12.59    13.57     5.05 US
167 3 P -2000.00  1996.09      3       0       0   -19.53    11.72   -13.20    18.24    13.98 US
169 4 R -2000.00  1996.09   3690       0       0  -843.75  1105.47  -333.85   504.74   378.61 US
173 4 R  -601.56   601.56   3690       0       0   -19.53    35.16      .33    22.76    22.76 US
```

CONCORDIA UNIVERSITY COMPUTER CENT

VOYAGE RECORDS

INDEX Nº 79-3-8.2
YR.-VOYAGE-TAPE FILE

DATE	20th August 1979
RECORDING TIME	1951:16 TO 1956:46 GMT
ELAPSED TIME	00 H 05 M 30 S
CONTRACTOR :	German & Milne Inc.
FINAL REPORT Nº	2627 TP
LOCATION	Baffin Bay
LAT :	72 ° 54 'N
LONG :	60 ° 17 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 5.74 M
AFT: 7.84 M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				Ice strip
ICE COVER 1Y 2Y+MY TOT	TENTHS				Vicinity of bergy bits
SNOW COVER	CM				and Tabular Bergs
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				*
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE Determine structural response to random impacts in bergy water.

REASON FOR SAMPLING PATTERN: Collect a broad range of data for possible future analysis. Alarms set to record impacts 300 με

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☒
INTERVAL= 30 SECS
TAPE INFO HEADER ☒
EOF ☒
OMIT CHANNELS: (SEE APPENDIX A) 66,75,92,93,110,127,151

VIDEO RECORDING -
TIME : TO
TAPE Nº: GMT
PHOTOS = -
# TO

COMMENTS All alarms triggered by S/G channel #142. Acutal gauge readings, in Microstrains, are equal to one-half the values on the printout. See Appendix A.

```
1 TO START HERE
2 TO SEARCH FOR START TIME.
3 TO SEARCH FOR ALARMS.
4 TO MODIFY ALARMS.
>>? 1
END DATE   (Y OR N) >>? N

1 MONITORING
2 DUMP
>>? 2
 TYPE?>>? N
 EOF.
 LAST TIME 79Y  8M 20D 19H 32M 46S
      40 TAPE RECORDS READ.                    TAPE 8  File 2
 TYPE STATISTICS?
? AL
 ADR R/M    MIN.AL    MAX.AL    #REC    #<MIN    #>MAX     MIN       MAX      MEAN      RMS      SD
   1 3 P    -24.50     24.45     281      0        0        .43       .86       .65      .65      .10 M/S.S
   2 3 P    -24.50     24.45     281      0        0       -.77      2.38      -.14      .39      .37 M/S.S
  31 3 P    -24.50     24.45     281      0        0      -6.13     -6.08     -6.12     6.12      .02 M/S.S
  34 4 R   -601.56    601.56    1187      0        0     -19.53      0.00    -10.85    10.98     1.69 US
  35 3 P   -601.56    601.56     281      0        0      19.53     42.97     42.02    42.04     1.49 US
  36 4 R   -601.56    601.56    1187      0        0       3.91     35.16     10.15    10.36     2.11 US
  38 3 P   -601.56    601.56     281      0        0     -23.44     11.72    -20.33    20.72     2.88 US
  39 4 R   -601.56    601.56    1187      0        0     -15.63     39.06     35.06    35.14     2.37 US
  40 3 P   -601.56    601.56     281      0        0     -27.34      7.81    -23.95    24.11     2.74 US
  41 4 R   -601.56    601.56    1187      0        0     -15.63     27.34     23.88    23.95     2.09 US
  42 3 P   -601.56    601.56     281      0        0       3.91      7.81      3.92     3.93      .23 US
  43 4 R   -601.56    601.56    1187      0        0     -23.44      0.00    -16.02    16.18     2.30 US
  44 3 P   -601.56    601.56     281      0        0      -7.81      3.91     -2.43     3.12     1.95 US
  48 4 R  -2000.00   1996.09    1187      0        0     343.75    347.66    343.86   343.86      .64 US
  53 3 P  -2000.00   1996.09     281      0        0     300.78    339.84    301.40   301.41     2.73 US
  58 3 P  -2000.00   1996.09     281      0        0     303.91    319.53    304.53   304.53     1.65 US
  59 4 R   -601.56    601.56    1187      0        0     226.56    234.38    231.88   231.89     1.09 US
  60 4 R  -2000.00   1996.09    1187      0        0     312.50    335.94    312.68   312.69     1.36 US
  63 3 P  -2000.00   1996.09     280      0        0     324.22    332.03    327.85   327.85     1.29 US
  65 4 R   -601.56    601.56    1187      0        0       0.00      3.91      1.91     2.73     1.95 US
  66 3 P  -2000.00   1996.09     280      0        0    1410.16   1996.09   1465.53  1466.28    46.96 US
  67 4 R   -601.56    601.56    1187      0        0     -35.16      3.91    -29.83    29.77     2.85 US
  71 3 P   -601.56    601.56     280      0        0      -7.81     15.63      -.82     2.28     2.13 US
  72 4 R  -2000.00   1996.09    1187      0        0     464.84   1980.47   1841.28  1842.05    53.57 US
  75 3 P  -2000.00   1996.09     280      0        0    1996.09   1996.09   1996.09  1996.09     0.00 US
  77 4 R   -601.56    601.56    1187      0        0     -35.16     11.72    -31.29    31.35     1.94 US
  78 3 P   -601.56    601.56     280      0        0     -31.25     15.63    -28.41    28.80     3.25 US
  79 4 R   -601.56    601.56    1187      0        0       0.00      7.81      2.28     2.99     1.93 US
  82 3 P   -601.56    601.56     280      0        0      -7.81      7.81     -4.05     4.23     1.23 US
  85 3 P   -601.56    601.56     280      0        0     -27.34    -11.72    -19.77    19.97     2.86 US
  88 4 R   -601.56    601.56    1187      0        0      -3.91     27.34     -3.42     3.92     1.91 US
  90 4 R   -601.56    601.56    1187      0        0     -15.63      3.91     -7.61     7.94     2.27 US
  91 3 P   -601.56    601.56     280      0        0       3.91     11.72      3.93     3.96      .47 US
  92 4 R  -2000.00   1996.09    1187      0        0    1996.09   1996.09   1996.09  1996.09     0.00 US
  93 4 R  -2000.00   1996.09    1187      0        0    1996.09   1996.09   1996.09  1996.09     0.00 US
  94 4 R   -601.56    601.56    1187      0        0     285.16    292.97    288.19   288.20     2.49 US
  97 3 P   -601.56    601.56     280      0        0     333.16    342.97    338.31   338.31     2.31 US
 100 4 R   -601.56    601.56    1187      0        0      31.25     78.13     71.53    72.06     8.74 US
 105 3 P   -601.56    601.56     280      0        0     -58.59    -50.78    -55.19    55.24     2.26 US
 106 4 R   -601.56    601.56    1187      0        0    -164.06   -138.72   -151.70   151.80     3.74 US
 108 4 R   -601.56    601.56    1187      0        0     117.19    125.00    119.21   119.23     2.30 US
 109 3 P   -601.56    601.56     280      0        0     -27.34    -19.53    -24.02    24.16     2.58 US
 110 4 R   -601.56    601.56    1187      0        0      27.34     42.97     37.98    38.03     1.97 US
 112 3 P   -601.56    601.56     280      0        0     406.25    417.97    412.53   412.53     2.00 US
 115 4 R   -601.56    601.56    1187      0        0      -7.81      0.00     -3.21     3.60     1.62 US
 116 3 P  -2000.00   1996.09     280      0        0    1175.78   1183.59   1179.42  1179.42     1.58 US
 117 4 R  -2000.00   1996.09    1187      0        0    1210.94   1230.47   1219.12  1219.13     4.11 US
 118 4 R   -601.56    601.                                 62.50     66.41     66.38    66
                  CONCORDIA UNIVERSITY                                             COMPUTER CEN'
 120 3 P   -601.56    601.56     280      0        0     253.91    261.72    256.84   256.84     1.76 US
 123 4 R  -2000.00   1996.09    1187      0        0    1035.16   1042.97   1039.03  1039.03     1.01 US
 124 3 P  -2000.00   1996.09     280      0        0    -230.47   -226.56   -230.01   230.01     1.26 US
 127 4 R  -2000.00   1996.09    1187      0        0    1031.25   1035.16   1035.11  1035.11      .44 US
 129 3 P  -2000.00   1996.09     280      0        0       0.00     31.25      3.18     3.99     2.41 US
 132 4 R   -601.56    601.56    1187      0        0     -50.78      3.91    -44.37    44.46     2.89 US
 133 3 P  -2000.00   1996.09     280      0        0   -1304.69  -1218.75  -1303.82  1303.83     5.28 US
 134 4 R   -601.56    601.56    1187      0        0     -15.63     54.69     50.74    50.85     3.31 US
 135 3 P  -2000.00   1996.09     274      0        0     -27.34     11.72    -25.53    25.71     2.97 US
 137 4 R   -601.56    601.56    1187      0        0       3.91     27.34     27.02    27.06     1.30 US
 139 3 P  -2000.00   1996.09     239      0        0     -46.88    164.06    -42.49    44.58    13.50 US
 140 4 R   -601.56    601.56    1187      0        0    -183.59     42.97     39.14    39.76     7.00 US
 142 4 R   -601.56    601.56    1187      1        0    -718.75      3.91    -93.99    95.86    18.83 US
 144 3 P  -2000.00   1996.09     234      0        0      -7.81     23.44     -3.91     4.51     2.26 US
 145 4 R  -2000.00   1996.09    1187      0        0    -921.88    300.78    138.92   143.32    37.69 US
 147 3 P  -2000.00   1996.09     233      0        0     -23.44     19.53    -11.87    12.11     2.39 US
 153 4 R   -601.56    601.56    1187      0        0      -3.91     39.06     35.46    35.53     2.21 US
 158 3 P  -2000.00   1996.09     102      0        0    1996.09   1996.09   1996.09  1996.09     0.00 US
 160 4 R   -601.56    601.56    1187      0        0     -31.25    -11.72    -24.08    24.28     3.15 US
 162 4 R   -601.56    601.56    1187      0        0     -15.63     15.63     11.81    11.89     1.33 US
 166 4 R   -601.56    601.56    1187      0        0     -11.72      7.81     -8.37     8.53     1.74 US
 167 3 P  -2000.00   1996.09       0      0        0     -19.53    156.25      2.44    58.19    42.15 US
 169 4 R  -2000.00   1996.09    1187      0        0    -707.03    871.09     21.13    39.95    33.92 US
 173 4 R   -601.56    601.56    1187      0        0     -19.53     11.72    -17.96    18.09     2.12 US

1 NEW OUTPUT
2 NEW SEARCH
3 NEW FILE
4 TERMINATE EXECUTION
5 TO RE-PROCESS THE TAPE
>>? 3
FILE START
  79/ 8/20.   19.56. 7.
1938.2 SAMPLES / SEC.
NUMBER OF SENSORS TRUNCATED TO .255.
```

VOYAGE RECORDS

INDEX Nº 79-3-8.3
YR. – VOYAGE – TAPE FILE

DATE 20th August 1979
RECORDING TIME 1956:07 TO 2002:31 GMT
ELAPSED TIME 00 H 06 M 24 S

CONTRACTOR: German & Milne Inc.
FINAL REPORT Nº 2627 TP

LOCATION Baffin Bay
LAT: 72 ° 54 'N
LONG: 60 ° 17 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 5.74 M
AFT: 7.84 M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				Ice strip. Vicinity of bergy bits and tabular bergs.
ICE COVER 1Y 2Y+MY TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	*
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE Determine structural response to random impacts in bergy water.
REASON FOR SAMPLING PATTERN: Collect a broad range of data for possible future analysis. Alarms set to record impacts >300 με

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☒
INTERVAL= 30 SECS
TAPE INFO HEADER ☒
EOF ☒
OMIT CHANNELS: (SEE APPENDIX A) 66,75,92,93,110,127

VIDEO RECORDING TAPE Nº:
TIME: TO GMT
PHOTOS = -
# TO

COMMENTS Actual gauge readings, in Microstrains, are equal to one-half the values on the printout. See Appendix A.

```
LAST TIME 7VT  8H 20D 20H  2M 31S
   762 TAPE RECORDS READ.
TYPE STATISTICS?                                   TAPE 8  FILE 3
T AL
ABR R/M   MIN.AL   MAX.AL   #REC  #<MIN  #>MAX      MIN      MAX     MEAN      RMS       SD
  1 3 P   -24.50    24.45   3557      0      0      .33     1.00      .65      .66      .11 M/S.S
  2 3 P   -24.50    24.45   3557      0      0    -1.34     3.02      .14      .46      .43 M/S.S
 31 3 P   -24.50    24.45   3557      0      0    -6.13    -6.08    -6.12     6.12      .02 M/S.S
 34 4 R  -601.56   601.56  15041      0      0   -50.78    35.16     1.03    28.05    28.03 US
 35 3 P  -601.56   601.56   3557      0      0   -97.66    42.97     2.68    43.45    43.38 US
 36 4 R  -601.56   601.56  15041      0      0   -15.63    46.88     9.14    20.75    18.63 US
 38 3 P  -601.56   601.56   3557      0      0   -46.88    35.16    -6.91    26.03    25.10 US
 39 4 R  -601.56   601.56  15041      0      0   -42.97     3.91   -23.64    25.85    10.47 US
 40 3 P  -601.56   601.56   3557      0      0   -27.34    27.34    -5.26    18.82    18.07 US
 41 4 R  -601.56   601.CONCORDIA UNIVERSITY     -58.59   121.09    27.56   COMPUTER CENT
 42 3 P  -601.56   601.56   3557      0      0   -15.63    31.25     7.44    17.22    15.53 US
 43 4 R  -601.56   601.56  15041      0      0   -42.97    27.34     -.42    20.06    20.06 US
 46 3 P  -601.56   601.56   3556      0      0   -31.25    39.06     6.21    22.85    21.99 US
 48 4 R -2000.00  1996.09  15041      0      0   343.75   347.66   345.70   345.70      .91 US
 53 3 P -2000.00  1996.09   3551      0      0   304.69   339.84   320.04   320.22    10.81 US
 58 3 P -2000.00  1996.09   3550      0      0   492.19   523.44   508.13   508.19     8.19 US
 59 4 R  -601.56   601.56  15041      0      0   -78.13   261.72   234.06   234.60    15.98 US
 60 4 R -2000.00  1996.09  15041      0      0   316.41   347.66   328.89   329.00     8.48 US
 63 3 P -2000.00  1996.09   3550      0      0   324.22   335.94   327.51   327.51     1.98 US
 65 4 R  -601.56   601.56  15041      0      0    -7.81    11.72     6.07     7.42     4.27 US
 66 3 P -2000.00  1996.09   3550      0      0  1355.47  1996.09  1784.45  1798.74   224.32 US
 69 4 R  -601.56   601.56  15041      0      0   -35.16    23.44     2.58    23.04    22.90 US
 71 3 P  -601.56   601.56   3550      0      0   -19.53    23.44    -7.03    11.79     9.47 US
 72 4 R -2000.00  1996.09  15041      0      0   191.41  1996.09  1299.82  1437.95   614.96 US
 75 3 P -2000.00  1996.09   3550      0      0  1222.66  1996.09  1748.48  1777.42   319.52 US
 77 4 R  -601.56   601.56  15041      0      0   -19.53    39.06     3.17    20.08    20.00 US
 78 3 P  -601.56   601.56   3550      0      0   -31.25    46.88    13.12    27.39    24.05 US
 79 4 R  -601.56   601.56  15041      0      0   -31.25    35.16   -11.04    25.73    23.24 US
 82 3 P  -601.56   601.56   3550      0      0   -31.25    35.16   -12.79    18.64    13.56 US
 85 3 P  -601.56   601.56   3550      0      0   -58.59    -3.91   -31.31    34.70    14.96 US
 88 4 R  -601.56   601.56  15041      0      0   -11.72    50.78    17.89    24.83    17.22 US
 90 4 R  -601.56   601.56  15041      0      0   -39.06    23.44    -8.42    22.55    21.81 US
 91 3 P  -601.56   601.56   3550      0      0     0.00    11.72     3.41     4.62     3.12 US
 92 4 R -2000.00  1996.09  15041      0      0  1996.09  1996.09  1996.09  1996.09     0.00 US
 93 4 R -2000.00  1996.09  15041      0      0  1996.09  1996.09  1996.09  1996.09     0.00 US
 96 4 R  -601.56   601.56  15041      0      0   285.16   296.88   290.92   290.93     2.26 US
 97 3 P  -601.56   601.56   3550      0      0   535.16   546.88   541.52   541.52     2.23 US
100 4 R  -601.56   601.56  15041      0      0    31.25    78.13    72.21    72.63     7.80 US
103 3 P  -601.56   601.56   3550      0      0   -58.59   -50.78   -56.99    57.02     2.01 US
106 4 R  -601.56   601.56  15041      0      0  -171.88  -136.72  -152.23   152.33     5.65 US
108 4 R  -601.56   601.56  15041      0      0   117.19   125.00   121.81   121.83     2.34 US
109 3 P  -601.56   601.56   3550      0      0   -31.25   -19.53   -25.51    25.60     2.19 US
110 4 R  -601.56   601.56  15041      0      0    23.44    42.97    38.46    38.49     1.63 US
112 3 P  -601.56   601.56   3550      0      0   406.25   417.97   410.82   410.82     1.84 US
115 4 R  -601.56   601.56  15041      0      0    -7.81     0.00    -2.13     3.02     2.15 US
116 3 P -2000.00  1996.09   3550      0      0  1175.78  1187.50  1181.85  1181.85     2.10 US
117 4 R -2000.00  1996.09  15041      0      0  1214.84  1238.28  1224.65  1224.66     4.00 US
118 4 R  -601.56   601.56  15041      0      0    62.50    66.41    63.51    63.54     1.71 US
120 3 P  -601.56   601.56   3550      0      0   250.00   261.72   254.92   254.93     1.72 US
123 4 R -2000.00  1996.09  15041      0      0  1035.16  1042.97  1038.67  1038.68     1.91 US
124 3 P -2000.00  1996.09   3550      0      0  -234.38  -226.56  -230.25   230.25     1.03 US
127 4 R -2000.00  1996.09  15041      0      0  1027.34  1035.16  1031.77  1031.77     1.37 US
129 3 P -2000.00  1996.09   3550      0      0   -27.34    78.13    12.25    23.33    19.86 US
132 4 R  -601.56   601.56  15041      0      0   -46.88     3.91   -21.58    26.24    14.93 US
133 3 P -2000.00  1996.09   3548      0      0 -1335.94 -1140.63 -1270.70  1271.44    43.47 US
134 4 R  -601.56   601.56  15041      0      0   -42.97    42.97    -7.28    27.90    26.94 US
135 3 P -2000.00  1996.09   3503      0      0   -58.59    15.63   -25.08    32.18    20.18 US
137 4 R  -601.56   601.56  15041      0      0     3.91    27.34    14.17    15.47     6.21 US
139 3 P -2000.00  1996.09   2941      0      0   -19.53   164.06    -5.18    14.88    13.93 US
140 4 R  -601.56   601.56  15041      0      0  -226.56    15.63   -83.68   118.21    83.49 US
142 4 R  -601.56   601.56  15041      1      0  -792.97    70.31   -96.26   226.46   205.00 US
144 3 P -2000.00  1996.09   2918      0      0   -19.53    35.16    -2.08    19.43    19.32 US
145 4 R -2000.00  1996.09  15041      0      0 -1351.56   546.88  -461.59   831.81   692.01 US
147 3 P -2000.00  1996.09   2913      0      0   -35.16    27.34    -5.45    22.51    21.84 US
153 4 R  -601.56   601.56  15041      0      0   -42.97    19.53   -13.82    20.00    14.48 US
158 3 P -2000.00  1996.09    704      0      0   199.22  1996.09  1272.97  1419.72   629.06 US
160 4 R  -601.56   601.56  15041      0      0   -35.16    23.44   -10.10    17.90    14.78 US
162 4 R  -601.56   601.56  15041      0      0   -35.16    50.78    11.93    32.37    30.10 US
164 4 R  -601.56   601.56  15041      0      0   -23.44    -3.91   -14.61    15.43     4.96 US
167 3 P -2000.00  1996.09      4      0      0   -11.72    11.72    -5.86    11.72    11.72 US
169 4 R -2000.00  1996.09  15041      0      0 -1011.72  1097.66  -147.58   678.75   660.48 US
173 4 R  -601.56   601.56  15041      0      0   -27.34    42.97     9.31    23.35    21.41 US
```

VOYAGE RECORDS

INDEX Nº 79-3-8.4
YR.-VOYAGE-TAPE FILE

DATE 20th August 1979
RECORDING TIME 2003:51 TO 2037:33 GMT
ELAPSED TIME 00 H 33 M 42 S

CONTRACTOR: German & Milne Inc.
FINAL REPORT Nº 2627 TP

LOCATION Baffin Bay off west coast of Greenland
LAT: 72 ° 54 'N
LONG: 60 ° 17 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 5.74 M AFT: 7.84 M
CARGO ☐ BALLAST ☒
BUBBLER ON ☐ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				Ice strip. Vicinity of bergy bits and tabular bergs.
ICE COVER 1Y 2Y+MY TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	*
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE Determine structural response to random impacts in bergy water.
REASON FOR SAMPLING PATTERN: Collect a broad range of data for possible future analysis.

RECORDING NOTES
MODE RECORDING ☒
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☒ EOF ☐
OMIT CHANNELS: (SEE APPENDIX A) 66,75,92,93,110,127

VIDEO RECORDING TAPE Nº:
TIME: TO GMT
PHOTOS = 3
# 2 - 1 TO 2 - 4

COMMENTS Actual gauge readings, in microstrains, are equal to one-half the values on the printout. See Appendix A.

8.4

TAPE 8 FILE 4

```
LAST TIME 79Y  8M 20D 20H 37M  05
END TIME  79Y  8M 20D 20H 37M  05
THIS TIME 79Y  8M 20D 20H 37D  15
  3978 TAPE RECORDS READ.
TYPE STATISTICS?
? AL
 ADR R/M    MIN.AL    MAX.AL     #REC    #<MIN    #>MAX       MIN       MAX      MEAN       RMS        SD
   1 3 P    -24.50     24.45    18563        0        0       .14      1.00       .58       .59       .13 M/S.S
   2 3 P    -24.50     24.45    18563        0        0     -1.01     11.91       .43       .83       .72 M/S.S
  31 3 P    -24.50     24.45    18563        0        0     -6.13     -6.08     -6.11      6.11       .02 M/S.S
  34 4 R   -601.56    601.56    78532        0        0    -50.78     46.88     -4.71     23.93     23.48 US
  35 3 P   -601.56    601.56    18563      559        0  -1070.31     78.13    -52.64    203.68    196.76 US
  36 4 R   -601.56    601.56    78532        0        0    -27.34     74.22     28.63     38.17     25.24 US
  38 3 P   -601.56    601.56    18563        0        0    -39.06     39.06     -8.21     16.81     15.83 US
  39 4 R   -601.56    601.56    78532        1        0   -726.56     35.16     -6.55     24.18     23.19 US
  40 3 P   -601.56    601.56    18563        0        0    -46.88     35.16      5.35     20.17     19.45 US
  41 4 R   -601.56    601.56    78532        0        0   -180.16    113.28     -5.60     42.40     42.03 US
  42 3 P   -601.56    601.56    18563        0        0    -54.69     31.25     -8.53     27.13     25.75 US
  43 4 R   -601.56    601.56    78532        0        0    -46.88     27.34     -5.02     19.89     19.25 US
  46 3 P   -601.56    601.56    18541        0        0    -50.78     39.06     -8.48     26.46     25.07 US
  48 4 R  -2000.00   1996.09    78532        0        0    343.75    347.66    344.80    344.80      1.73 US
  53 3 P  -2000.00   1996.[illegible]                       281.25    343.75    314.96    31[illegible]
  58 3 P  -2000.00   1996.09    18530        0        0    492.19    531.25    509.68    509.76      8.75 US
  59 4 R   -601.56    601.56    78532        0        0   -164.06    265.63    217.77    228.05     57.71 US
  60 4 R  -2000.00   1996.09    78532        0        0    316.41    347.66    330.76    330.85      7.51 US
  63 3 P  -2000.00   1996.09    18530        0        0    324.22    347.66    329.35    329.38      2.08 US
  65 4 R   -601.56    601.56    78532        0        0    -19.53     15.63      7.27      9.19      5.62 US
  66 3 P  -2000.00   1996.09    18530        0        0   1261.72   1996.09   1809.45   1824.78    236.06 US
  69 4 R   -601.56    601.56    78532        0        0    -46.88     23.44     -4.45     20.62     20.14 US
  71 3 P   -601.56    601.56    18530        0        0    -54.69     46.88     -3.85     14.17     13.64 US
  72 4 R  -2000.00   1996.09    78532        0        0    117.19   1996.09   1196.25   1347.97    621.31 US
  75 3 P  -2000.00   1996.09    18530        0        0    933.59   1996.09   1709.84   1750.18    373.83 US
  77 4 R   -601.56    601.56    78532        0        0    -46.88     35.16     -2.07     23.02     22.93 US
  78 3 P   -601.56    601.56    18530        0        0    -50.78     46.88     -2.69     23.78     23.63 US
  79 4 R   -601.56    601.56    78532        0        0    -31.25     31.25     -5.33     20.39     19.68 US
  82 3 P   -601.56    601.56    18530        0        0    -31.25     46.88      1.37     22.73     22.71 US
  85 3 P   -601.56    601.56    18530        0        0    -74.22      7.81    -34.38     40.12     20.67 US
  88 4 R   -601.56    601.56    78532        0        0    -27.34     82.50     21.59     32.15     23.83 US
  90 4 R   -601.56    601.56    78532        0        0    -54.69     35.16     -3.49     22.34     22.06 US
  91 3 P   -601.56    601.56    18530        0        0    -31.25     15.63       .49     10.93     10.92 US
  92 4 R  -2000.00   1996.09    78532        0        0   1996.09   1996.09   1996.09   1996.09      0.00 US
  93 4 R  -2000.00   1996.09    78532        0        0   1996.09   1996.09   1996.09   1996.09      0.00 US
  96 4 R   -601.56    601.56    78532        0        0    285.16    300.78    291.62    291.63      1.98 US
  97 3 P   -601.56    601.56    18530        0        0    335.16    350.78    341.23    341.28      2.34 US
 100 4 R   -601.56    601.56    78532        0        0     31.25     82.03     72.09     72.54      8.08 US
 105 3 P   -601.56    601.56    18530        0        0    -62.50    -50.78    -58.98     59.00      1.79 US
 106 4 R   -601.56    601.56    78532        0        0   -187.97   -128.91   -149.25    149.33      3.47 US
 108 4 R   -601.56    601.56    78532        0        0    117.19    128.91    122.32    122.34      2.17 US
 109 3 P   -601.56    601.56    18530        0        0    -27.34    -11.72    -20.60     20.80      2.90 US
 110 4 R   -601.56    601.56    78532        0        0     27.34     42.97     38.72     38.75      1.38 US
 112 3 P   -601.56    601.56    18530        0        0    410.16    429.69    419.47    419.49      4.49 US
 115 4 R   -601.56    601.56    78532        0        0     -7.81      0.00     -1.78      2.66      1.98 US
 116 3 P  -2000.00   1996.09    18530        0        0   1175.78   1187.50   1182.69   1182.69      1.82 US
 117 4 R  -2000.00   1996.09    78532        0        0   1199.22   1250.00   1218.34   1218.36      5.58 US
 118 4 R   -601.56    601.56    78532        0        0     62.50     74.22     70.48     70.56      3.50 US
 120 3 P   -601.56    601.56    18530        0        0    250.00    261.72    258.93    258.98      2.43 US
 123 4 R  -2000.00   1996.09    78532        0        0   1031.25   1039.06   1036.04   1036.04      1.64 US
 124 3 P  -2000.00   1996.09    18530        0        0   -234.38   -226.56   -230.39    230.39       .94 US
 127 4 R  -2000.00   1996.09    78532        0        0   1031.25   1039.06   1035.31   1035.31      1.48 US
 129 3 P  -2000.00   1996.09    18530        0        0   -246.09     82.03     -3.08     46.29     46.19 US
 132 4 R   -601.56    601.56    78532        0        0    -50.78     42.97     -4.93     26.99     26.54 US
 133 3 P  -2000.00   1996.09    18529        0        0  -1335.94  -1117.19  -1288.81   1289.58     44.27 US
 134 4 R   -601.56    601.56    78532        0        0   -103.59     58.59    -12.62     43.63     41.79 US
 135 3 P  -2000.00   1996.09    18281        0        0    -50.78     39.06     -8.37     24.08     22.58 US
 137 4 R   -601.56    601.56    78532        0        0    -27.34     31.25     13.09     15.97      9.15 US
 139 3 P  -2000.00   1996.09    13325        0        0    -35.16    167.97     -7.38     10.87      7.98 US
 140 4 R   -601.56    601.56    78532        0        0   -273.44     58.59    -64.06    106.71     85.35 US
 142 4 R   -601.56    601.56    78532     2371        0  -1046.88     66.41    -68.32    208.10    194.45 US
 144 3 P  -2000.00   1996.09    13250        0        0    -23.44     42.97     -4.24     19.48     19.01 US
 145 4 R  -2000.00   1996.09    78531        0        0  -1347.66    730.47   -438.88    749.66    607.77 US
 147 3 P  -2000.00   1996.09    13244        0        0    -31.25     42.97      7.10     21.33     20.11 US
 153 4 R   -601.56    601.56    78531        0        0    -58.59     58.59      5.19     27.76     27.27 US
 158 3 P  -2000.00   1996.09     3293        0        0    222.66   1996.09   1268.68   1403.79    600.99 US
 160 4 R   -601.56    601.56    78531        0        0    -58.59     39.06      1.23     21.86     21.82 US
 162 4 R   -601.56    601.56    78531        0        0    -35.16     46.88     -5.32     28.14     27.63 US
 166 4 R   -601.56    601.56    78531        0        0    -19.53      0.00    -12.19     13.17      4.99 US
 167 3 P  -2000.00   1996.09        3        0        0    -19.53     -3.91    -11.72     16.11     13.53 US
 169 4 R  -2000.00   1996.09    78531        0        0  -1140.63   1191.41     29.48    686.08    685.45 US
 173 4 R   -601.56    601.56    78531        0        0    -46.88     46.88      2.16     24.32     24.23 US
CONTINUE???? N
```

CONCORDIA UNIVERSITY COMPUTER CENT

VOYAGE RECORDS

INDEX Nº 79-3-9.1
YR.-VOYAGE-TAPE FILE

DATE 20th August 1979
RECORDING TIME 2100:50 TO 2354:08 GMT
ELAPSED TIME 02 H 53 M 18 S

CONTRACTOR: German & Milne Inc.
FINAL REPORT Nº 2627 TP

LOCATION Off West Coast of Greenland
LAT: 74 ° 'N
LONG: 62 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.7 M
AFT: 10.7 M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				
ICE COVER ☐ 1Y ☐ 2Y+MY ☐ TOT	TENTHS				Ice patch
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	*
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

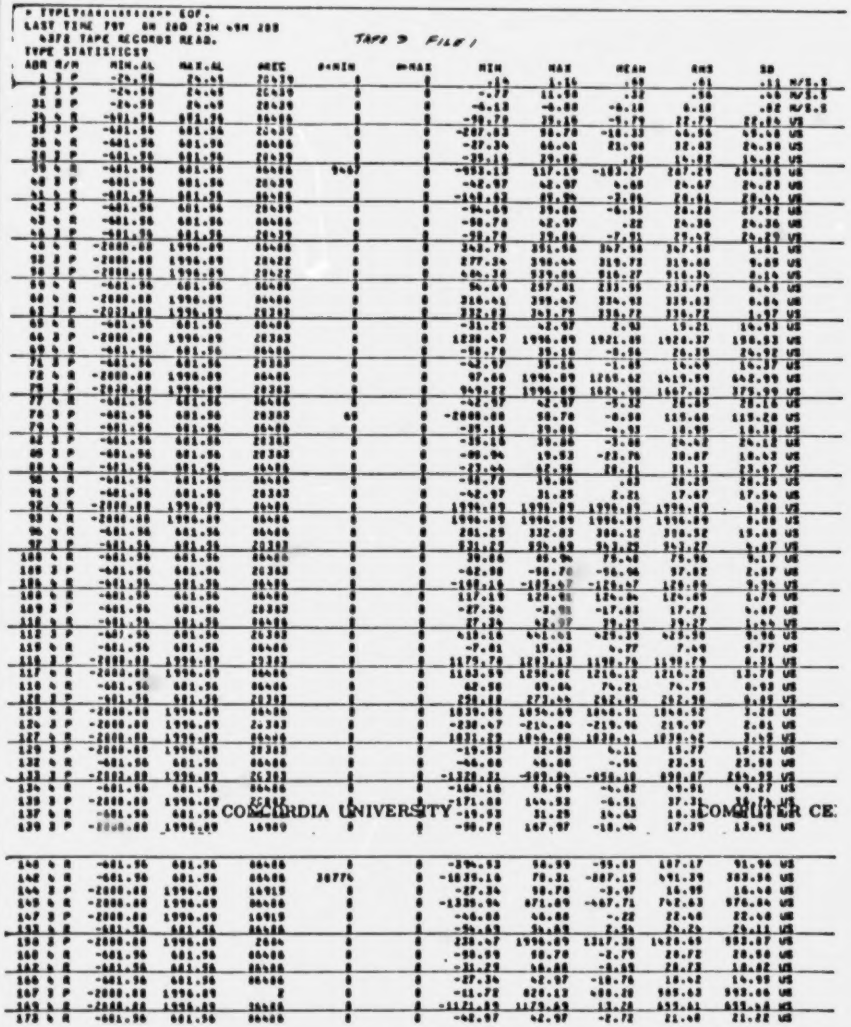
RATIONALE
REASON FOR TAPE Compare structural responses in open water and while traversing ice patch.
REASON FOR SAMPLING PATTERN: Collect a broad range of data for possible future analysis. Alarms set to record impacts >300 με

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☒
INTERVAL= 30 SECS
TAPE INFO HEADER ☒
EOF ☒
OMIT CHANNELS: (SEE APPENDIX A) 66,75,92,93,110,127

VIDEO RECORDING - TAPE Nº:
TIME: TO GMT
PHOTOS = -
# TO

COMMENTS Actual gauge readings, in Microstrains, are equal to one-half the values on the printout. See Appendix A.



TAPE 3 FILE 1

CONCORDIA UNIVERSITY COMPUTER CE

VOYAGE RECORDS

INDEX Nº 79-3-10.1
YR - VOYAGE - TAPE FILE

DATE 20th - 21st August 1979 RECORDING TIME 2354:30 TO 0127:47 GMT
ELAPSED TIME 01 H 33 M 17 S

CONTRACTOR : German & Milne Inc. FINAL REPORT Nº 2627 TP

LOCATION Baffin Bay LAT : 74 ° 37 'N LONG : 64 ° 67 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.7 M AFT: 10.7 M
CARGO ☐ BALLAST ☒
BUBBLER ON ☐ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				Ice patch. 10 km across with bergy bits.
ICE COVER 1Y 2Y+MY TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	*
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE Determine structural response to ice breaking.
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis. Alarms set to record impacts >300 με

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☒ INTERVAL= 30 SECS
TAPE INFO HEADER ☒ EOF ☐
OMIT CHANNELS: (SEE APPENDIX A) 66,75,92,93,110,127

VIDEO RECORDING - TAPE Nº:
TIME : TO GMT
PHOTOS = -
# TO

COMMENTS Tape header problems. Data may be inaccessible.

No printout available

VOYAGE RECORDS

INDEX Nº 79-3-11.1
YR.-VOYAGE-TAPE FILE

DATE	21st August 1979	RECORDING TIME 2024:22 TO 2147:00 GMT ELAPSED TIME 01 H 22 M 38 S
CONTRACTOR :	German & Milne Inc.	FINAL REPORT Nº 2627 TP
LOCATION	Baffin Bay at entrance to Lancaster Sound	LAT : 74 ° 32 'N LONG : 74 ° 58 'W
OPERATING CONDITIONS (SHIP)	DRAUGHT FWD: 10.7 M AFT: 10.7 M	CARGO ☐ BALLAST ☒ BUBBLER ON ☐ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				Open water
ICE COVER IY 2Y+MY TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				*
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE Determine structural response in open water.

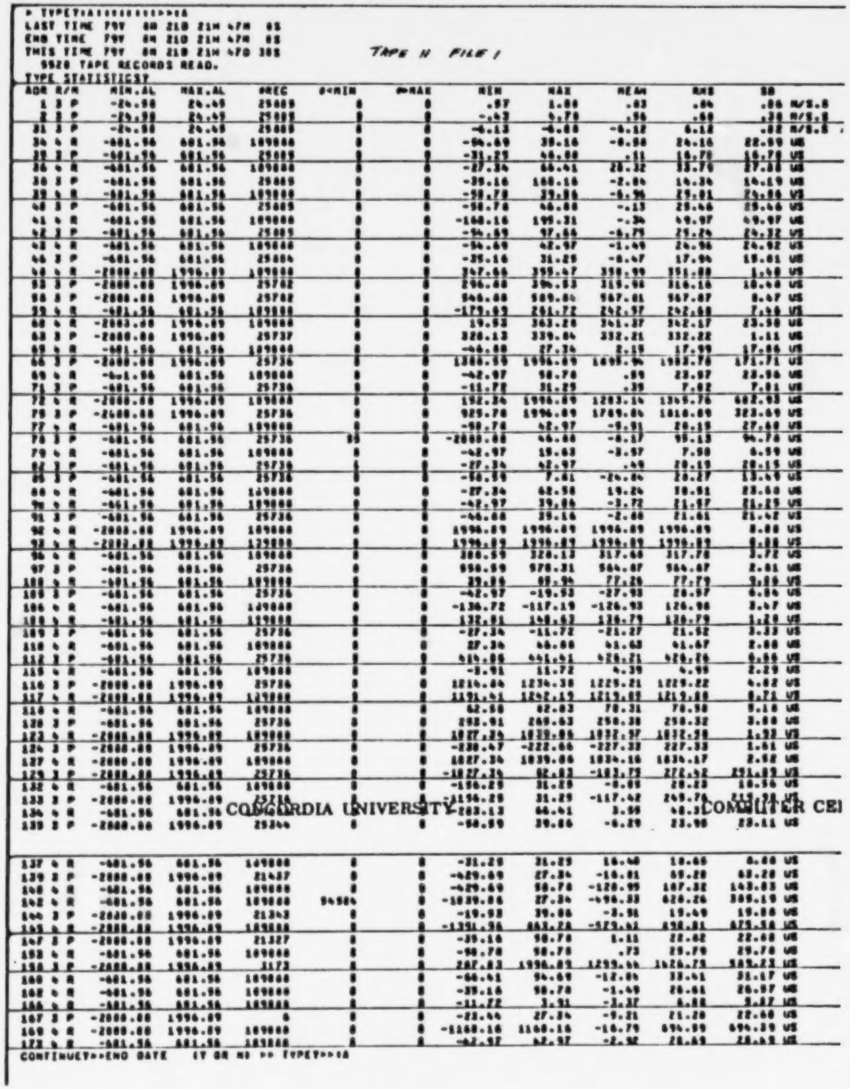
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis. Alarms set to record impacts > 300 με

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☒
INTERVAL= 30 SECS
TAPE INFO HEADER ☒
EOF ☒
OMIT CHANNELS: (SEE APPENDIX A) 66,75,92,93,110,127

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS = -
# TO

COMMENTS Actual gauge readings, in Microstrains, are equal to one-half the values on the printout. See Appendix A.



TAPE N FILE 1

CONCORDIA UNIVERSITY COMPUTER CE

VOYAGE RECORDS

INDEX Nº 79-3-12.1
YR.–VOYAGE–TAPE FILE

DATE	22nd August 1979
RECORDING TIME	0124:10 TO 0219:00 GMT
ELAPSED TIME	00 H 54 M 50 S
CONTRACTOR :	German & Milne Inc.
FINAL REPORT Nº	2627 TP
LOCATION	Entrance to Lancaster Sound
LAT :	73 ° 59 'N
LONG :	82 ° 17 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.7 M
AFT: 10.7 M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				Slush ice about 8 km across
ICE COVER 1Y 2Y+MY TOT	TENTHS			30	
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

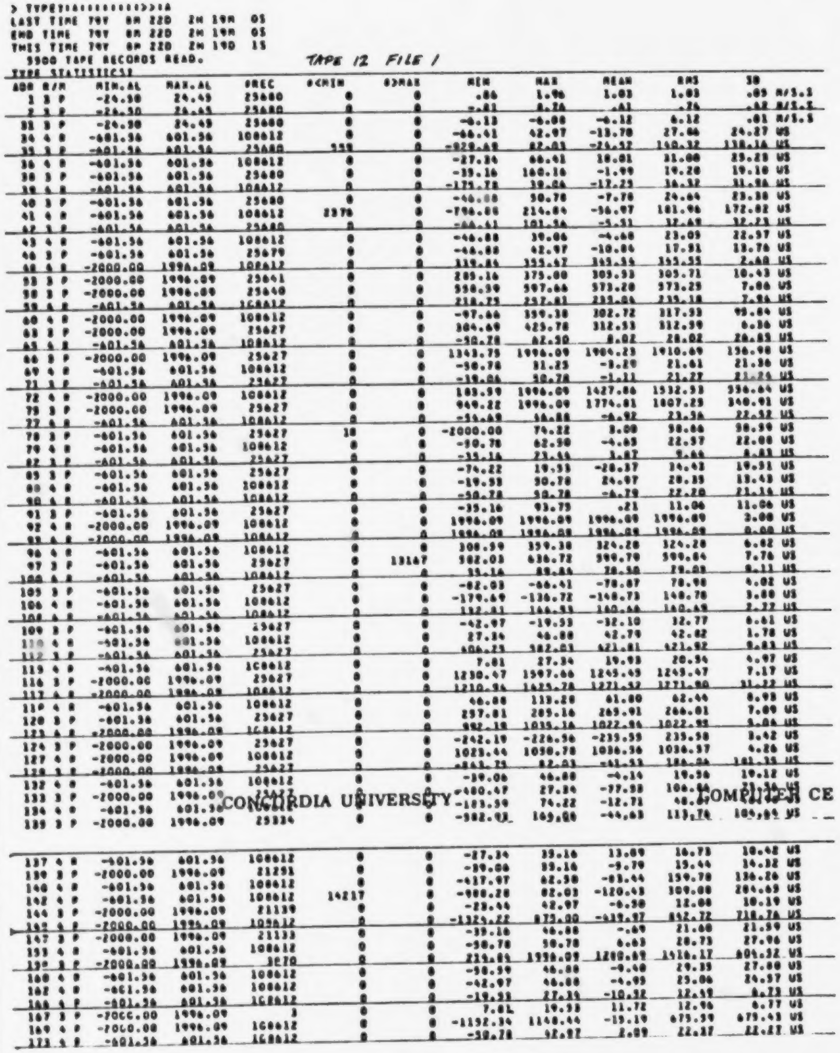
RATIONALE Determine structural response to ice breaking.
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis. Alarms set to record impacts >300 με

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☒
INTERVAL= 30 SECS
TAPE INFO HEADER ☒
EOF ☐
OMIT CHANNELS: (SEE APPENDIX A) 66, 75, 92, 93, 110, 127

VIDEO RECORDING - TAPE Nº:
TIME : TO GMT
PHOTOS = 1
# 2 - 6 TO

COMMENTS Actual gauge readings, in Microstrains, are equal to one-half the values on the printout. See Appendix A.



```
> TYPE
LAST TIME 79Y 8M 22D 2H 19M 05
END TIME  79Y 8M 22D 2H 19M 05
THIS TIME 79Y 8M 22D 2H 19D 15
  5900 TAPE RECORDS READ.
TYPE STATISTICS:
ADR R/M  MIN.AL  MAX.AL  #REC  #<MIN  #>MAX  MIN  MAX  MEAN  RMS  SD
```

TAPE 12 FILE 1

CONCORDIA UNIVERSITY COMPUTER CE

VOYAGE RECORDS

INDEX Nº 79-3-13.1
YR.-VOYAGE-TAPE FILE

DATE: 22nd August 1979
RECORDING TIME: 0226:26 TO 0242:17 GMT
ELAPSED TIME: 00 H 15 M 51 S

CONTRACTOR: German & Milne Inc.
FINAL REPORT Nº 2627 TP

LOCATION: Lancaster Sound
LAT: 73 ° 54 'N
LONG: 83 ° 30 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.7 M
AFT: 10.7 M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	30	
ICE COVER 1Y 2Y+MY TOT	TENTHS		*	5	Brash ice
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

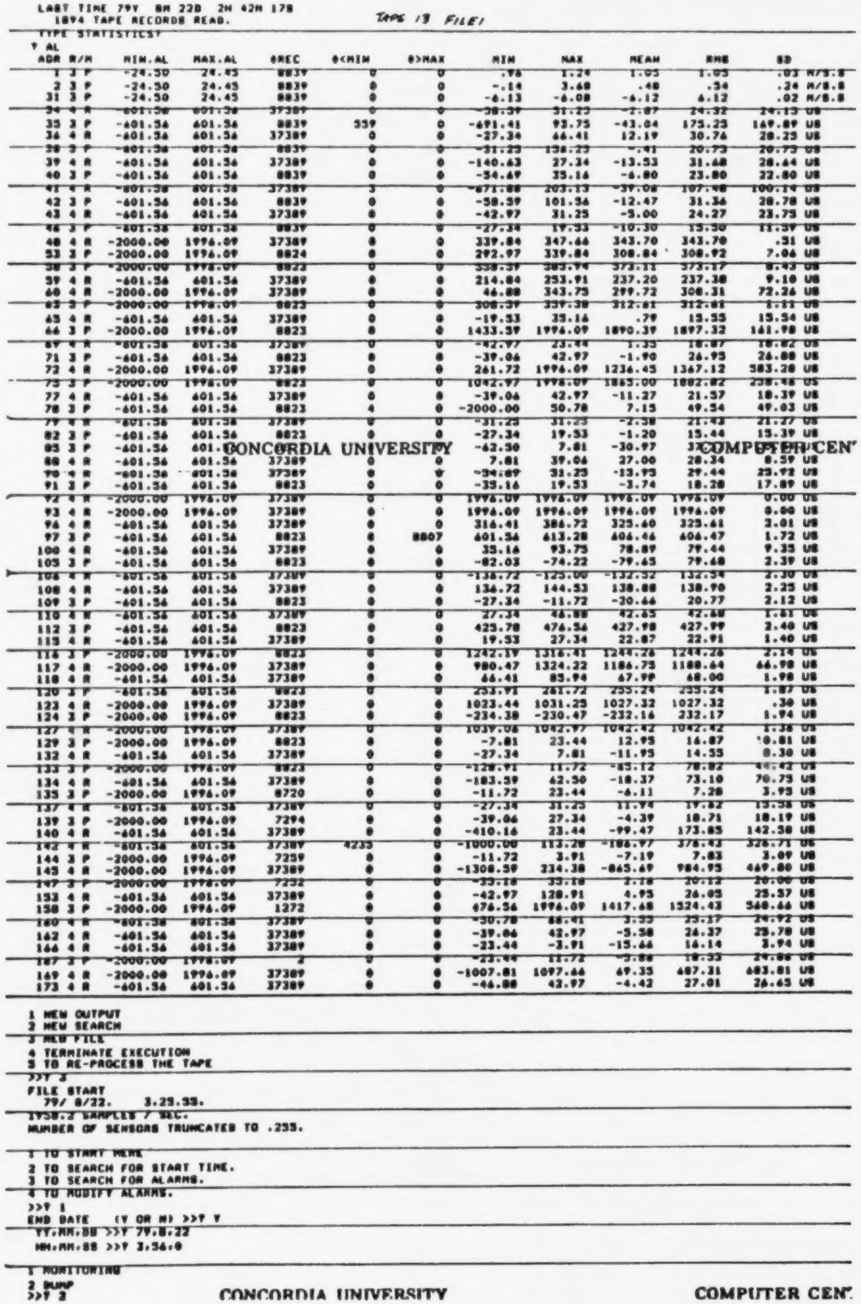
ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE: Determine structural response to ice breaking.
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis. Alarms set to record impacts > 300 με

RECORDING NOTES
MODE: RECORDING ☐ STANDBY ☒
INTERVAL= 30 SECS
TAPE INFO: HEADER ☒ EOF ☒
OMIT CHANNELS: (SEE APPENDIX A) 66, 75, 92, 93, 110, 127

VIDEO RECORDING - TAPE Nº:
TIME: TO GMT
PHOTOS = -
# TO

COMMENTS: Actual gauge readings, in Microstrains, are equal to one-half the values on the printout. See Appendix A.



```
LAST TIME 79Y  8M 22D  2H 42M 17S
  1894 TAPE RECORDS READ.                         TAPE 13  FILE1
TYPE STATISTICS?
? AL
ADR R/M    MIN.AL    MAX.AL    #REC   #<MIN   #>MAX       MIN       MAX      MEAN       RMS        SD
  1 3 P    -24.50     24.45    8839       0       0       .96      1.24      1.05      1.05      .03 M/S.S
  2 3 P    -24.50     24.45    8839       0       0      -.14      3.60       .48       .54      .24 M/S.S
 31 3 P    -24.50     24.45    8839       0       0     -6.13     -6.08     -6.12      6.12      .02 M/S.S
 34 4 R   -601.56    601.56   37389       0       0    -38.39     31.25     -2.87     24.32    24.15 US
 35 3 P   -601.56    601.56    8839     359       0   -691.41     93.75    -43.04    175.25   169.89 US
 36 4 R   -601.56    601.56   37389       0       0    -27.34     66.41     12.19     30.76    28.25 US
 38 3 P   -601.56    601.56    8839       0       0    -31.25    138.23      -.41     20.73    20.73 US
 39 4 R   -601.56    601.56   37389       0       0   -140.63     27.34    -13.53     31.68    28.64 US
 40 3 P   -601.56    601.56    8839       0       0    -54.69     35.16     -6.80     23.80    22.80 US
 41 4 R   -601.56    601.56   37389       3       0   -671.88    203.13    -39.06    107.48   100.14 US
 42 3 P   -601.56    601.56    8839       0       0    -58.59    101.56    -12.47     31.36    28.78 US
 43 4 R   -601.56    601.56   37389       0       0    -42.97     31.25     -5.00     24.27    23.75 US
 46 3 P   -601.56    601.56    8839       0       0    -27.34     19.53    -10.30     15.50    11.59 US
 48 4 R  -2000.00   1996.09   37389       0       0    339.84    347.66    343.70    343.70      .51 US
 53 3 P  -2000.00   1996.09    8824       0       0    292.97    339.84    308.84    308.92     7.06 US
 58 3 P  -2000.00   1996.09    8823       0       0    358.39    385.74    373.11    373.17     6.43 US
 59 4 R   -601.56    601.56   37389       0       0    214.84    253.91    237.20    237.38     9.10 US
 60 4 R  -2000.00   1996.09   37389       0       0     46.88    343.75    299.72    308.31    72.26 US
 63 3 P  -2000.00   1996.09    8823       0       0    308.59    339.38    312.81    312.82     1.11 US
 65 4 R   -601.56    601.56   37389       0       0    -19.53     35.16       .79     15.55    15.54 US
 66 3 P  -2000.00   1996.09    8823       0       0   1433.59   1996.09   1890.39   1897.32   161.98 US
 69 4 R   -601.56    601.56   37389       0       0    -42.97     23.44      1.35     18.87    18.82 US
 71 3 P   -601.56    601.56    8823       0       0    -39.06     42.97     -1.90     26.95    26.88 US
 72 4 R  -2000.00   1996.09   37389       0       0    261.72   1996.09   1236.45   1367.12   583.28 US
 75 3 P  -2000.00   1996.09    8823       0       0   1042.97   1996.09   1863.00   1882.82   258.48 US
 77 4 R   -601.56    601.56   37389       0       0    -39.06     42.97    -11.27     21.57    18.39 US
 78 3 P   -601.56    601.56    8823       4       0  -2000.00     50.78      7.15     49.54    49.03 US
 79 4 R   -601.56    601.56   37389       0       0    -31.25     31.25     -2.38     21.43    21.27 US
 82 3 P   -601.56    601.56    8823       0       0    -27.34     19.53     -1.20     15.44    15.39 US
 85 3 P   -601.56  [illegible] [illegible] [illegible] [illegible] -62.50  7.81    -30.97  [illegible] [illegible]
 88 4 R   -601.56    601.56   37389       0       0      7.81     39.06     27.00     28.34     8.59 US
 90 4 R   -601.56    601.56   37389       0       0    -54.69     31.25    -13.95     29.44    25.92 US
 91 3 P   -601.56    601.56    8823       0       0    -35.16     19.53     -3.74     18.28    17.89 US
 92 4 R  -2000.00   1996.09   37389       0       0   1996.09   1996.09   1996.09   1996.09     0.00 US
 93 4 R  -2000.00   1996.09   37389       0       0   1996.09   1996.09   1996.09   1996.09     0.00 US
 96 4 R   -601.56    601.56   37389       0       0    316.41    386.72    325.60    325.61     3.01 US
 97 3 P   -601.56    601.56    8823       0    8807    601.56    613.28    606.46    606.47     1.72 US
100 4 R   -601.56    601.56   37389       0       0     35.16     93.75     78.89     79.44     9.35 US
105 3 P   -601.56    601.56    8823       0       0    -82.03    -74.22    -79.65     79.68     2.39 US
106 4 R   -601.56    601.56   37389       0       0   -136.72   -125.00   -132.52    132.54     2.30 US
108 4 R   -601.56    601.56   37389       0       0    136.72    144.53    138.88    138.90     2.25 US
109 3 P   -601.56    601.56    8823       0       0    -27.34    -11.72    -20.66     20.77     2.12 US
110 4 R   -601.56    601.56   37389       0       0     27.34     46.88     42.65     42.68     1.61 US
112 3 P   -601.56    601.56    8823       0       0    425.78    476.56    427.98    427.99     2.40 US
115 4 R   -601.56    601.56   37389       0       0     19.53     27.34     22.87     22.91     1.40 US
116 3 P  -2000.00   1996.09    8823       0       0   1242.19   1316.41   1244.26   1244.26     2.14 US
117 4 R  -2000.00   1996.09   37389       0       0    980.47   1324.22   1186.75   1188.64    66.98 US
118 4 R   -601.56    601.56   37389       0       0     66.41     85.94     67.99     68.00     1.98 US
120 3 P   -601.56    601.56    8823       0       0    253.91    261.72    255.24    255.24     1.87 US
123 4 R  -2000.00   1996.09   37389       0       0   1023.44   1031.25   1027.32   1027.32      .30 US
124 3 P  -2000.00   1996.09    8823       0       0   -234.38   -230.47   -232.16    232.17     1.94 US
127 4 R  -2000.00   1996.09   37389       0       0   1039.06   1042.97   1042.42   1042.42     1.38 US
129 3 P  -2000.00   1996.09    8823       0       0     -7.81     23.44     12.95     16.87    10.81 US
132 4 R   -601.56    601.56   37389       0       0    -27.34      7.81    -11.95     14.55     8.30 US
133 3 P  -2000.00   1996.09    8823       0       0   -128.91     11.72    -65.12     78.82    44.42 US
134 4 R   -601.56    601.56   37389       0       0   -183.59     62.50    -18.37     73.10    70.75 US
135 3 P  -2000.00   1996.09    8720       0       0    -11.72     23.44     -6.11      7.28     3.95 US
137 4 R   -601.56    601.56   37389       0       0    -27.34     31.25     11.94     19.82    15.58 US
139 3 P  -2000.00   1996.09    7294       0       0    -39.06     27.34     -4.39     18.71    18.19 US
140 4 R   -601.56    601.56   37389       0       0   -410.16     23.44    -99.47    173.85   142.58 US
142 4 R   -601.56    601.56   37389    4235       0  -1000.00    113.28   -186.97    378.43   328.71 US
144 3 P  -2000.00   1996.09    7259       0       0    -11.72      3.91     -7.19      7.83     3.09 US
145 4 R  -2000.00   1996.09   37389       0       0  -1308.59    234.38   -865.69    984.95   469.80 US
147 3 P  -2000.00   1996.09    7252       0       0    -35.16     35.16      2.18     20.12    20.00 US
153 4 R   -601.56    601.56   37389       0       0    -42.97    128.91      4.95     26.05    25.57 US
158 3 P  -2000.00   1996.09    1272       0       0    476.56   1996.09   1417.68   1524.43   540.66 US
160 4 R   -601.56    601.56   37389       0       0    -50.78     66.41      3.55     25.17    24.92 US
162 4 R   -601.56    601.56   37389       0       0    -39.06     42.97     -5.38     26.37    25.78 US
166 4 R   -601.56    601.56   37389       0       0    -23.44     -3.91    -15.66     16.14     3.94 US
167 3 P  -2000.00   1996.09       2       0       0    -23.44     11.72     -5.86     18.55    24.06 US
169 4 R  -2000.00   1996.09   37389       0       0  -1007.81   1097.66     69.35    687.31   683.81 US
173 4 R   -601.56    601.56   37389       0       0    -46.88     42.97     -4.42     27.01    26.65 US

1 NEW OUTPUT
2 NEW SEARCH
3 NEW FILE
4 TERMINATE EXECUTION
5 TO RE-PROCESS THE TAPE
>>? 3
FILE START
  79/ 8/22.    3.25.55.
1958.2 SAMPLES / SEC.
NUMBER OF SENSORS TRUNCATED TO .255.

1 TO START HERE
2 TO SEARCH FOR START TIME.
3 TO SEARCH FOR ALARMS.
4 TO MODIFY ALARMS.
>>? 1
END DATE   (Y OR N) >>? Y
 YY.MM.DD >>? 79.8.22
 HH.MM.SS >>? 3.56.0

1 MONITORING
2 DUMP
>>? 2                  CONCORDIA UNIVERSITY                    COMPUTER CEN
```

VOYAGE RECORDS

INDEX Nº 79-3-13.2
YR.–VOYAGE–TAPE FILE

DATE	22nd August 1979	RECORDING TIME	0325:55	TO	0356:00	GMT
		ELAPSED TIME	00H	30 M	05 S	

CONTRACTOR : German & Milne Inc.

FINAL REPORT Nº 2627 TP

LOCATION Lancaster Sound

LAT : 73 ° 54 'N
LONG : 83 ° 30 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.7 M
AFT: 10.7 M
CARGO ☐
BALLAST ☑
BUBBLER ON ☐
OFF ☑

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM			30	Brash ice strip Some frazil ice
ICE COVER [1Y] [2Y+MY] [TOT]	TENTHS		*	5	
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE Determine structural response to ice breaking.

REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis. Alarms set to record impacts > 300 με

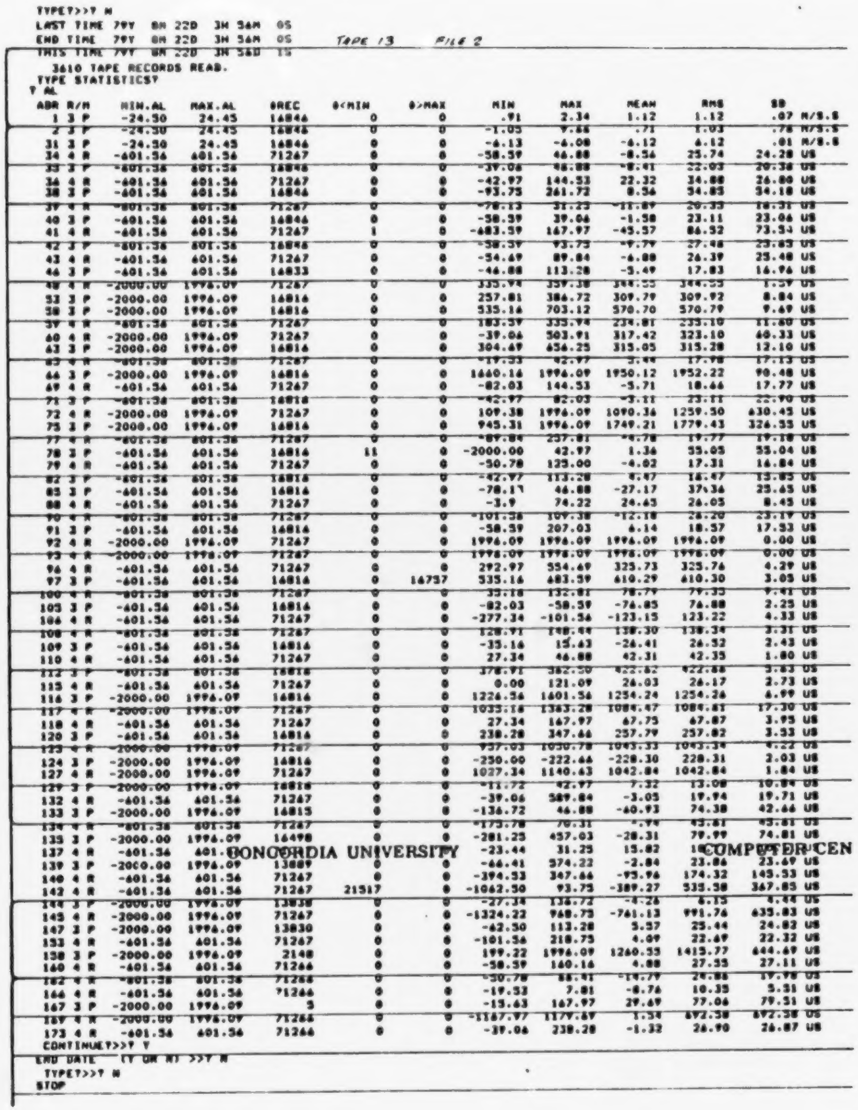
RECORDING NOTES

MODE RECORDING ☐
STANDBY ☑ INTERVAL= 30 SECS
TAPE INFO HEADER ☑ EOF ☐
OMIT CHANNELS: (SEE APPENDIX A) 66, 75, 92, 93, 110, 127

VIDEO RECORDING - TAPE Nº:
TIME : TO GMT

PHOTOS = 1
# 2 - 7 TO

COMMENTS Actual gauge readings, in Microstrains, are equal to one-half the values on the printout. See Appendix A.



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TYPE?>>? M
LAST TIME 79Y  8M 22D  3H 56M  0S
END TIME  79Y  8M 22D  3H 56M  0S        TAPE 13     FILE 2
THIS TIME 79Y  8M 22D  3H 56D  1S
  3610 TAPE RECORDS READ.
TYPE STATISTICS?
? AL
ABR R/M   MIN.AL    MAX.AL    #REC   #<MIN   #>MAX      MIN      MAX     MEAN      RMS       SD
  1 3 P   -24.50     24.45   16846       0       0      .91     2.34     1.12     1.12      .07 M/S.S
  2 3 P   -24.50     24.45   16846       0       0    -1.05     9.66      .71     1.03      .78 M/S.S
 31 3 P   -24.50     24.45   16846       0       0    -6.13    -6.08    -6.12     6.12      .01 M/S.S
 34 4 R  -601.56    601.56   71267       0       0   -58.59    46.88    -8.56    25.74    24.28 US
 35 3 P  -601.56    601.56   16846       0       0   -39.06    46.88    -8.41    22.03    20.38 US
 36 4 R  -601.56    601.56   71267       0       0   -42.97   144.53    22.32    34.88    26.80 US
 38 3 P  -601.56    601.56   16846       0       0   -93.75   261.72     8.56    34.83    34.18 US
 37 4 R  -601.56    601.56   71267       0       0   -78.13    31.25   -11.89    20.33    16.31 US
 40 3 P  -601.56    601.56   16846       0       0   -58.59    39.06    -1.58    23.11    23.06 US
 41 4 R  -601.56    601.56   71267       1       0  -683.59   167.97   -45.57    86.52    73.54 US
 42 3 P  -601.56    601.56   16846       0       0   -58.59    93.75    -9.79    27.48    25.65 US
 43 4 R  -601.56    601.56   71267       0       0   -54.69    89.84    -6.88    26.39    25.48 US
 44 3 P  -601.56    601.56   16833       0       0   -46.88   113.28    -5.49    17.83    16.96 US
 48 4 R -2000.00   1996.09   71267       0       0   335.94   359.38   344.55   344.55     1.59 US
 53 3 P -2000.00   1996.09   16816       0       0   257.81   386.72   309.79   309.92     8.84 US
 58 3 P -2000.00   1996.09   16816       0       0   535.16   703.12   570.70   570.79     9.69 US
 57 4 R  -601.56    601.56   71267       0       0   183.59   335.94   234.81   235.10    11.60 US
 60 4 R -2000.00   1996.09   71267       0       0   -39.06   503.91   317.42   323.10    60.33 US
 63 3 P -2000.00   1996.09   16816       0       0   304.69   656.25   315.05   315.28    12.10 US
 65 4 R  -601.56    601.56   71267       0       0   -19.53    42.97     3.44    17.78    17.13 US
 66 3 P -2000.00   1996.09   16816       0       0  1660.16  1996.09  1950.12  1952.22    90.48 US
 69 4 R  -601.56    601.56   71267       0       0   -82.03   144.53    -5.71    18.66    17.77 US
 71 3 P  -601.56    601.56   16816       0       0   -42.97    82.03    -3.11    23.11    22.90 US
 72 4 R -2000.00   1996.09   71267       0       0   109.38  1996.09  1090.36  1259.50   630.45 US
 75 3 P -2000.00   1996.09   16816       0       0   945.31  1996.09  1749.21  1779.43   326.55 US
 77 4 R  -601.56    601.56   71267       0       0   -89.84   257.81    -4.78    19.77    19.18 US
 78 3 P  -601.56    601.56   16816      11       0 -2000.00    42.97     1.36    55.05    55.04 US
 79 4 R  -601.56    601.56   71267       0       0   -50.78   125.00    -4.02    17.31    16.84 US
 82 3 P  -601.56    601.56   16816       0       0   -42.97   113.28     4.47    16.47    15.85 US
 85 3 P  -601.56    601.56   16816       0       0   -78.11    46.88   -27.17    37.36    25.65 US
 88 4 R  -601.56    601.56   71267       0       0     -3.9    74.22    24.65    26.05     8.45 US
 90 4 R  -601.56    601.56   71267       0       0  -101.56   109.38   -12.18    26.20    23.19 US
 91 3 P  -601.56    601.56   16816       0       0   -58.59   207.03     6.14    18.57    17.53 US
 92 4 R -2000.00   1996.09   71267       0       0  1996.09  1996.09  1996.09  1996.09     0.00 US
 93 4 R -2000.00   1996.09   71267       0       0  1996.09  1996.09  1996.09  1996.09     0.00 US
 96 4 R  -601.56    601.56   71267       0       0   292.97   554.69   325.73   325.76     4.29 US
 97 3 P  -601.56    601.56   16816       0   16737   535.16   683.59   610.29   610.30     3.05 US
100 4 R  -601.56    601.56   71267       0       0    35.16   132.81    78.79    79.35     9.41 US
103 3 P  -601.56    601.56   16816       0       0   -82.03   -58.59   -76.85    76.88     2.25 US
106 4 R  -601.56    601.56   71267       0       0  -277.34  -101.56  -123.15   123.22     4.33 US
108 4 R  -601.56    601.56   71267       0       0   128.91   148.44   138.30   138.34     3.31 US
109 3 P  -601.56    601.56   16816       0       0   -35.16    15.63   -26.41    26.52     2.43 US
110 4 R  -601.56    601.56   71267       0       0    27.34    46.88    42.31    42.35     1.80 US
112 3 P  -601.56    601.56   16816       0       0   378.91   382.50   422.62   422.66     3.63 US
115 4 R  -601.56    601.56   71267       0       0     0.00   121.09    26.03    26.17     2.73 US
116 3 P -2000.00   1996.09   16816       0       0  1226.56  1601.56  1254.24  1254.26     6.99 US
117 4 R -2000.00   1996.09   71267       0       0  1035.16  1363.28  1084.47  1084.61    17.30 US
118 4 R  -601.56    601.56   71267       0       0    27.34   167.97    67.75    67.87     3.95 US
120 3 P  -601.56    601.56   16816       0       0   238.28   347.66   257.79   257.82     3.53 US
123 4 R -2000.00   1996.09   71267       0       0   937.03  1050.78  1043.33  1043.34     4.22 US
124 3 P -2000.00   1996.09   16816       0       0  -250.00  -222.66  -228.30   228.31     2.03 US
127 4 R -2000.00   1996.09   71267       0       0  1027.34  1140.63  1042.84  1042.84     1.84 US
129 3 P -2000.00   1996.09   16816       0       0   -11.72    42.97     7.32    13.08    10.84 US
132 4 R  -601.56    601.56   71267       0       0   -39.06   589.84    -3.05    19.94    19.71 US
133 3 P -2000.00   1996.09   16815       0       0  -136.72    46.88   -60.93    74.38    42.66 US
134 4 R  -601.56    601.56   71267       0       0  -175.78    70.31     -.94    43.81    43.81 US
135 3 P -2000.00   1996.09   16498       0       0  -281.25   457.03   -28.31    79.99    74.81 US
137 4 R  -601.56    601.CONCORDIA UNIVERSITY   -23.44    31.25    15.82   1COMPUTER CEN
139 3 P -2000.00   1996.09   13889       0       0   -66.41   574.22    -2.84    23.86    23.69 US
140 4 R  -601.56    601.56   71267       0       0  -394.53   347.66   -95.96   174.32   145.53 US
142 4 R  -601.56    601.56   71267   21517       0 -1062.50    93.75  -389.27   535.38   367.85 US
144 3 P -2000.00   1996.09   13838       0       0   -27.34   136.72    -4.26     6.15     4.44 US
145 4 R -2000.00   1996.09   71267       0       0 -1324.22   968.75  -761.13   991.76   635.83 US
147 3 P -2000.00   1996.09   13830       0       0   -62.50   113.28     5.57    25.44    24.82 US
153 4 R  -601.56    601.56   71267       0       0  -101.56   218.75     4.09    22.69    22.32 US
158 3 P -2000.00   1996.09    2148       0       0   199.22  1996.09  1260.55  1415.77   644.69 US
160 4 R  -601.56    601.56   71266       0       0   -58.59   160.16     4.88    27.55    27.11 US
162 4 R  -601.56    601.56   71266       0       0   -50.78    66.41   -14.79    24.88    19.98 US
164 4 R  -601.56    601.56   71266       0       0   -19.53     7.81    -8.76    10.35     5.51 US
167 3 P -2000.00   1996.09       5       0       0   -15.63   167.97    29.69    77.06    79.51 US
169 4 R -2000.00   1996.09   71266       0       0 -1167.97  1179.69     1.54   892.38   892.38 US
173 4 R  -601.56    601.56   71266       0       0   -39.06   238.28    -1.32    26.90    26.87 US
 CONTINUE?>>? Y
END DATE    (Y OR N) >>? N
 TYPE?>>? N
STOP
```

VOYAGE RECORDS

INDEX Nº 79-3-14.1
YR.-VOYAGE-TAPE FILE

DATE 22nd August 1979

RECORDING TIME 0512:37 TO 0537:07 GMT
ELAPSED TIME 00 H 24 M 30 S

CONTRACTOR : German & Milne Inc.

FINAL REPORT Nº 2627 TP

LOCATION Lancaster Sound

LAT : 73 ° 54 'N
LONG : 84 ° 36 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.7 M
AFT: 10.7 M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	5	15	
ICE COVER [1Y] [2Y+MY] [TOT]	TENTHS		*	9	10	Very close pack ice
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING			*	
ASTERN				
TURNING				

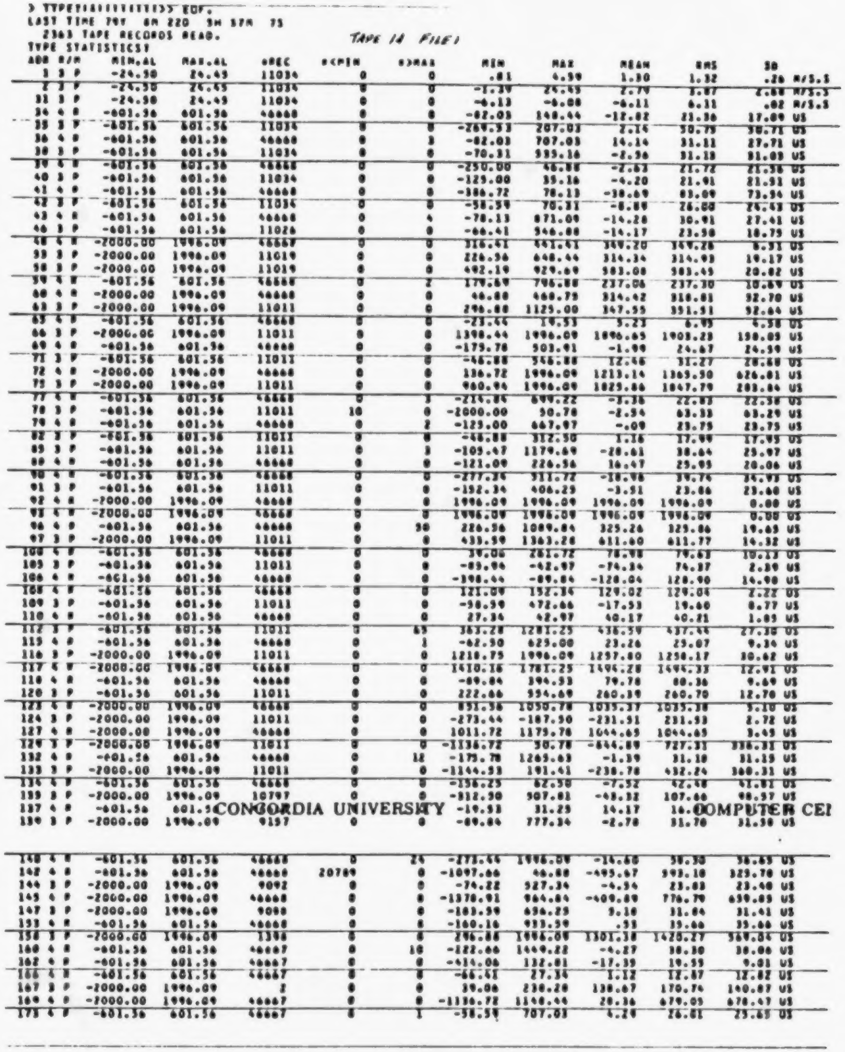
ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE Determine structural response to ice breaking.
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis. Alarms set to record impacts >300 με

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☒
INTERVAL= 30 SECS
TAPE INFO HEADER ☒
EOF ☐
OMIT CHANNELS: (SEE APPENDIX A) 66, 75, 92, 93, 110, 127

VIDEO RECORDING - TAPE Nº:
TIME : TO GMT
PHOTOS = -
# TO

COMMENTS Actual gauge readings, in microstrains, are equal to one-half the values on the printout. See Appendix A.



```
> TYPE(1)(1)(1)(1)(1)(1)55 EOF.
LAST TIME 79Y 8M 22D 5H 37M 7S
  2363 TAPE RECORDS READ.                    TAPE 14 FILE1
TYPE STATISTICS:
ADR R/M   MIN.AL   MAX.AL   #REC  #<MIN  #>MAX      MIN      MAX     MEAN      RMS       SD
  1 3 P   -24.50    24.45  11034      0      0      .81     4.59     1.30     1.32      .26 M/S.S
  2 3 P   -24.50    24.45  11034      0      0    -1.39    24.45     2.79     3.87     2.68 M/S.S
 31 3 P   -24.50    24.45  11034      0      0    -6.13    -6.08    -6.11     6.11      .02 M/S.S
 34 4 R  -601.56   601.56  46668      0      0   -82.03   148.44   -12.02    21.30    17.09 US
 35 3 P  -601.56   601.56  11034      0      0  -269.53   207.03     2.14    30.79    30.71 US
 36 4 R  -601.56   601.56  46668      0      3   -82.03   707.03    14.14    31.11    27.71 US
 38 3 P  -601.56   601.56  11034      0      0   -70.31   535.16    -2.56    31.18    31.08 US
 39 4 R  -601.56   601.56  46668      0      0  -250.00    46.88    -2.63    21.72    21.56 US
 40 3 P  -601.56   601.56  11034      0      0  -125.00    35.16    -4.20    21.91    21.51 US
 41 4 R  -601.56   601.56  46668      0      0  -386.72    78.13   -38.69    83.09    73.54 US
 42 3 P  -601.56   601.56  11034      0      0   -58.59    70.31    -8.89    26.08    24.53 US
 43 4 R  -601.56   601.56  46668      0      4   -78.13   871.09   -14.28    30.91    27.41 US
 46 3 P  -601.56   601.56  11026      0      0   -66.41   546.88   -14.17    23.58    18.79 US
 48 4 R -2000.00  1996.09  46667      0      0   316.41   441.41   369.20   369.28     6.51 US
 53 3 P -2000.00  1996.09  11019      0      0   226.56   648.44   314.34   314.93    19.17 US
 58 3 P -2000.00  1996.09  11019      0      0   492.19   929.69   383.00   383.45    20.82 US
 59 4 R  -601.56   601.56  46668      0      2   179.69   796.88   237.06   237.30    10.69 US
 60 4 R -2000.00  1996.09  46668      0      0    46.88   468.75   314.42   318.81    52.70 US
 63 3 P -2000.00  1996.09  11011      0      0   296.88  1125.00   347.55   351.51    52.64 US
 65 4 R  -601.56   601.56  46668      0      0   -23.44    19.53     5.23     6.95     4.58 US
 66 3 P -2000.00  1996.09  11011      0      0  1398.44  1996.09  1896.65  1903.23   158.05 US
 69 4 R  -601.56   601.56  46668      0      0  -175.78   503.91    -1.99    24.67    24.59 US
 71 3 P  -601.56   601.56  11011      0      0   -46.88   546.88    12.46    31.27    28.68 US
 72 4 R -2000.00  1996.09  46668      0      0   136.72  1996.09  1213.14  1365.50   626.81 US
 75 3 P -2000.00  1996.09  11011      0      0   960.94  1996.09  1825.86  1847.79   283.84 US
 77 4 R  -601.56   601.56  46668      0      3  -214.84   699.22    -3.36    22.83    22.58 US
 78 3 P  -601.56   601.56  11011     10      0 -2000.00    50.78    -2.54    63.33    63.29 US
 79 4 R  -601.56   601.56  46668      0      2  -125.00   667.97     -.09    23.75    23.75 US
 82 3 P  -601.56   601.56  11011      0      0   -46.88   312.50     1.16    17.99    17.95 US
 85 3 P  -601.56   601.56  11011      0      3  -105.47  1179.69   -20.61    38.64    25.97 US
 88 4 R  -601.56   601.56  46668      0      0  -121.09   226.56    16.47    25.95    20.06 US
 90 4 R  -601.56   601.56  46668      0      0  -277.34   311.72   -18.98    39.74    34.93 US
 91 3 P  -601.56   601.56  11011      0      0  -152.34   406.25    -3.51    23.86    23.60 US
 92 4 R -2000.00  1996.09  46668      0      0  1996.09  1996.09  1996.09  1996.09     0.00 US
 93 4 R -2000.00  1996.09  46668      0      0  1996.09  1996.09  1996.09  1996.09     0.00 US
 96 4 R  -601.56   601.56  46668      0     50   226.56  1089.84   325.26   325.86    19.63 US
 97 3 P -2000.00  1996.09  11011      0      0   433.59  1363.28   611.60   611.77    14.32 US
100 4 R  -601.56   601.56  46668      0      0    39.06   261.72    78.98    79.63    10.13 US
103 3 P  -601.56   601.56  11011      0      0   -85.94   -42.97   -74.34    74.37     2.39 US
106 4 R  -601.56   601.56  46668      0      0  -398.44   -89.84  -128.04   128.90    14.90 US
108 4 R  -601.56   601.56  46668      0      0   121.09   152.34   129.02   129.04     2.22 US
109 3 P  -601.56   601.56  11011      0      0   -58.59   472.66   -17.53    19.60     8.77 US
110 4 R  -601.56   601.56  46668      0      0    27.34    42.97    40.17    40.21     1.85 US
112 3 P  -601.56   601.56  11011      0     65   363.28  1281.25   436.59   437.44    27.38 US
115 4 R  -601.56   601.56  46668      0      1   -62.50   625.00    23.26    25.07     9.34 US
116 3 P -2000.00  1996.09  11011      0      0  1218.75  1996.09  1257.80  1258.17    30.62 US
117 4 R -2000.00  1996.09  46668      0      0  1410.16  1781.25  1494.28  1494.33    12.91 US
118 4 R  -601.56   601.56  46668      0      0   -89.84   394.53    79.78    80.36     9.69 US
120 3 P  -601.56   601.56  11011      0      0   222.66   554.69   260.39   260.70    12.70 US
123 4 R -2000.00  1996.09  46668      0      0   851.56  1050.78  1035.37  1035.38     5.10 US
124 3 P -2000.00  1996.09  11011      0      0  -273.44  -187.50  -231.51   231.53     2.72 US
127 4 R -2000.00  1996.09  46668      0      0  1011.72  1175.78  1044.65  1044.65     3.45 US
129 3 P -2000.00  1996.09  11011      0      0 -1136.72    50.78  -644.89   727.31   336.31 US
132 4 R  -601.56   601.56  46668      0     12  -175.78  1265.63    -1.39    31.18    31.15 US
133 3 P -2000.00  1996.09  11011      0      0 -1144.53   191.41  -238.78   432.24   360.31 US
134 4 R  -601.56   601.56  46668      0      0  -156.25    62.50    -7.52    42.48    41.81 US
135 3 P -2000.00  1996.09  10797      0      0  -312.50   507.81   -43.32   107.60    98.57 US
137 4 R  -601.56   601.5[illegible]                  -19.53    31.25    14.17    16.[illegible]
139 3 P -2000.00  1996.09   9157      0      0   -89.84   777.34    -2.78    31.70    31.58 US

140 4 R  -601.56   601.56  46668      0     24  -273.44  1996.09   -14.68    38.38    36.65 US
142 4 R  -601.56   601.56  46668  20789      0 -1097.66    46.88  -495.67   593.10   325.70 US
144 3 P -2000.00  1996.09   9092      0      0   -74.22   527.34    -4.54    23.83    23.40 US
145 4 R -2000.00  1996.09  46668      0      0 -1378.91   964.84  -409.89   776.79   659.85 US
147 3 P -2000.00  1996.09   9088      0      0  -183.59   656.25     5.18    31.84    31.41 US
153 4 R  -601.56   601.56  46668      0      0  -160.16   933.59      .53    35.66    35.66 US
158 3 P -2000.00  1996.09   1398      0      0   296.88  1996.09  1301.38  1420.27   569.06 US
160 4 R  -601.56   601.56  46667      0     10  -222.66  1449.22    -4.27    38.30    38.06 US
162 4 R  -601.56   601.56  46667      0      0  -414.06   132.81   -17.39    19.59     9.03 US
166 4 R  -601.56   601.56  46667      0      0   -66.41    27.34     1.12    12.87    12.82 US
167 3 P -2000.00  1996.09      2      0      0    39.06   238.28   138.67   170.74   140.07 US
169 4 R -2000.00  1996.09  46667      0      0 -1136.72  1148.44    28.36   679.05   678.47 US
173 4 R  -601.56   601.56  46667      0      1   -58.59   707.03     4.29    26.81    25.65 US
```

CONCORDIA UNIVERSITY COMPUTER CE

VOYAGE RECORDS

INDEX Nº 79-3-14.2
YR.-VOYAGE-TAPE FILE

DATE 22nd August 1979	RECORDING TIME 0632:41 TO 0711:30 GMT	ELAPSED TIME 00 H 38 M 49 S	
CONTRACTOR: German & Milne Inc.		FINAL REPORT Nº 2627 TP	
LOCATION Lancaster Sound	LAT: 73 ° 54 'N	LONG: 84 ° 36 'W	

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.7 M
AFT: 10.7 M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	20	Close pack ice. Occasional multi-year
ICE COVER [1Y] [2Y+MY] [TOT]	TENTHS		*	8	
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE Determine structural response to ice breaking.
Collect broad range of data for possible future analysis.
REASON FOR SAMPLING PATTERN: Alarms set to record impacts >300 με

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☒
INTERVAL= 30 SECS
TAPE INFO HEADER ☒
EOF ☐
OMIT CHANNELS: (SEE APPENDIX A) 66, 75, 92, 93, 110, 127

VIDEO RECORDING - TAPE Nº:
TIME: TO GMT
PHOTOS = 1
# 2 - 8 TO

COMMENTS Actual gauge readings, in Microstrains, are equal to one-half the values on the printout. See Appendix A.

TAPE 14 FILE 2

```
> TYPE(STATISTICS)>>E
LAST TIME 79Y  8M 22D  7H 11M 30S
END TIME  79Y  8M 22D  7H 11M 30S
THIS TIME 79Y  8M 22D  7H 11M 31S
  3124 TAPE RECORDS READ.
TYPE STATISTICS?
ADR E/M   MIN.AL   MAX.AL    #REC   #<MIN   #>MAX      MIN      MAX     MEAN      RMS       SD
  1 3 P   -24.50    24.45   14597       0       0      .06     6.46     1.18     1.18      .14 M/S.S
  2 3 P   -24.50    24.45   14597       0       0    -3.06    24.45     1.60     2.42     1.02 M/S.S
 31 3 P   -24.50    24.45   14597       0       0    -6.13    -6.08    -6.12     6.12      .02 M/S.S
 34 4 B  -601.56   601.56   61717       0       0  -164.06   237.81    -7.01    25.06    24.09 US
 35 3 P  -601.56   601.56   14597     559       0  -691.41   293.91   -39.02   143.20   138.05 US
 36 4 B  -601.56   601.56   61717       0       0   -89.84   214.84    21.84    31.99    23.37 US
 38 3 P  -601.56   601.56   14597       0       0  -125.00   347.66     9.91    50.31    49.33 US
 39 4 B  -601.56   601.56   61717       0       0  -171.88    39.06   -12.53    26.67    23.54 US
 40 3 P  -601.56   601.56   14597       0       0   -93.75    62.50    -8.80    24.73    23.11 US
 41 4 B  -601.56   601.56   61717    4731       0  -714.84   160.16   -79.23   203.13   188.68 US
 42 3 P  -601.56   601.56   14597       0       0   -54.69    97.66   -10.35    26.10    23.96 US
 43 4 B  -601.56   601.56   61717       0       0   -74.22   132.34    -9.56    25.67    23.82 US
 46 3 P  -601.56   601.56   14597       0       0   -58.59   367.19   -12.64    21.58    17.49 US
 48 4 B -2000.00  1996.09   61717       0       0   328.13   367.19   343.04   343.05     3.22 US
 53 3 P -2000.00  1996.09   14580       0       0   250.00   421.88   315.93   316.33    15.83 US
 58 3 P -2000.00  1996.09   14579       0       0   315.63  1023.44   502.92   503.16    16.76 US
 59 4 B  -601.56   601.56   61717       0       0   183.59   500.00   234.08   234.36    11.59 US
 60 4 B -2000.00  1996.09   61717       0       0  -148.44   613.28   236.85   294.89   155.87 US
 63 3 P -2000.00  1996.09   14562       0       0   296.88  1066.41   323.13   324.16    25.67 US
 65 4 B  -601.56   601.56   61717       0       0   -31.25    15.63      .07     4.10     4.09 US
 68 3 P -2000.00  1996.09   14561       0       0  1531.25  1996.09  1951.61  1953.38    83.13 US
 69 4 B  -601.56   601.56   61717       0       0  -136.72   269.53    -7.25    25.09    24.02 US
 71 3 P  -601.56   601.56   14561       0       0   -58.59   500.00     3.11    20.82    20.66 US
 72 4 B -2000.00  1996.09   61717       0       0    42.97  1996.09  1309.62  1421.24   561.58 US
 75 3 P -2000.00  1996.09   14561       0       0   964.84  1996.09  1777.45  1810.50   344.37 US
 77 4 B  -601.56   601.56   61717       0       0  -171.88   449.22    -7.60    30.34    29.35 US
 78 3 P  -601.56   601.56   14561      61       0 -2000.00    66.41   -11.24   131.92   131.45 US
 79 4 B  -601.56   601.56   61717       0       0  -101.56   359.38     -.82    20.82    20.80 US
 82 3 P  -601.56   601.56   14561       0       0   -85.94   210.94    -5.15    24.23    23.68 US
 85 3 P  -601.56   601.56   14561       0       0  -281.25   269.53   -23.49    34.25    24.92 US
 88 4 B  -601.56   601.56   61717       0       0  -296.88   175.78    10.32    23.94    15.41 US
 90 4 B  -601.56   601.56   61717      11       7  -707.03   679.69    -4.60    36.34    36.04 US
 91 3 P  -601.56   601.56   14561       0       0  -187.50   312.50    -3.70    26.15    25.89 US
 92 4 B -2000.00  1996.09   61717       0       0  1996.09  1996.09  1996.09  1996.09     0.00 US
 93 4 B -2000.00  1996.09   61717       0       0  1996.09  1996.09  1996.09  1996.09     0.00 US
 96 4 B  -601.56   601.56   61717       0      39   203.13  1410.16   322.95   323.50    18.85 US
 97 3 P -2000.00  1996.09   14561       0       0   449.22   984.38   611.35   611.46    11.62 US
100 4 B  -601.56   601.56   61717       0       0    35.16   324.22    78.50    79.21     9.94 US
105 3 P  -601.56   601.56   14561       0       0  -113.28   -46.88   -73.25    73.29     2.53 US
106 4 B  -601.56   601.56   61717       0       0  -332.03   -97.66  -120.61   121.58    15.37 US
108 4 B  -601.56   601.56   61717       0       0   125.00   152.34   135.78   135.79     2.06 US
109 3 P  -601.56   601.56   14561       0       0  -167.97   382.81   -15.23    16.20     5.52 US
110 4 B  -601.56   601.56   61717       0       0    27.34    46.88    41.71    41.75     1.98 US
112 3 P  -601.56   601.56   14561       0      76    62.50  1139.84   436.17   437.24    30.57 US
115 4 B  -601.56   601.56   61717       0       8  -144.53  1658.44    50.41    67.19    25.37 US
116 3 P -2000.00  1996.09   14561       0       0  1210.94  1996.09  1258.92  1259.19    26.32 US
117 4 B -2000.00  1996.09   61717       0       0  1433.59  1886.72  1490.08  1490.20    18.91 US
118 4 B  -601.56   601.56   61717       0       5  -281.25   734.38    82.99    85.11    18.88 US
120 3 P  -601.56   601.56   14561       0       9   222.66   824.22   258.66   259.02    13.63 US
123 4 B -2000.00  1996.09   61717       0       0   933.59  1054.69  1042.24  1042.25     3.94 US
124 3 P -2000.00  1996.09   14561       0       0  -277.34  -187.50  -228.29   228.31     2.78 US
127 4 B -2000.00  1996.09   61717       0       0  1015.63  1140.63  1044.90  1044.90     2.89 US
129 3 P -2000.00  1996.09   14561       0       0 -1160.16    58.59  -497.66   642.57   406.50 US
132 4 B  -601.56   601.56   61717       0      33  -164.06   878.91    -5.82    37.28    36.87 US
133 3 P -2000.00  1996.09   14561       0       0 -1339.84    70.31  -158.02   330.33   290.09 US
134 4 B  -601.56   601.5CONCORDIA UNIVERSITY-187.50    66.41   -21.48    60.COMPUTER CE
135 3 P -2000.00  1996.09   14336       0       0  -230.47  1070.31   -21.58    63.00    59.27 US

137 4 B  -601.56   601.56   61717       0       0   -27.34    31.25    11.10    16.82    12.38 US
139 3 P -2000.00  1996.09   12131       0       0  -152.34   933.59    -4.05    38.71    38.48 US
140 4 B  -601.56   601.56   61717       0       2  -210.94   609.38   -14.25    37.79    35.00 US
142 4 B  -601.56   601.56   61717   23691       0  -980.47   226.56  -415.03   575.60   398.84 US
144 3 P -2000.00  1996.09   12049       0       0   -70.31   382.81    -9.16    18.56    16.15 US
145 4 B -2000.00  1996.09   61717       0       0 -1453.13  1445.31  -345.68   769.33   687.33 US
147 3 P -2000.00  1996.09   12023       0       0  -183.59   597.66      .07    32.93    32.92 US
153 4 B  -601.56   601.56   61717       0       1  -222.66   609.38    -2.43    37.05    36.97 US
158 3 P -2000.00  1996.09    2067       0       0   230.47  1996.09  1300.93  1432.60   600.27 US
160 4 B  -601.56   601.56   61717       0       0  -351.56   554.69    -4.65    37.78    36.53 US
162 4 B  -601.56   601.56   61717       0       0  -187.50   132.81   -15.24    17.76     9.11 US
166 4 B  -601.56   601.56   61717       0       0   -19.53    19.53     -.69     5.21     5.16 US
167 3 P -2000.00  1996.09      10       0       0   -27.34   253.91    41.80   102.96    95.11 US
169 4 B -2000.00  1996.09   61717       0       0 -1070.31  1175.78    46.11   648.75   647.12 US
173 4 B  -601.56   601.56   61717       0       0   -97.66   148.44     3.00    21.71    21.51 US
CONTINUE?>>A
```

VOYAGE RECORDS

INDEX Nº 79-3-15.1
YR. – VOYAGE – TAPE FILE

DATE 22nd August 1979
RECORDING TIME 0835:31 TO 1113:35 GMT
ELAPSED TIME 02 H 38 M 04 S

CONTRACTOR : German & Milne Inc.
FINAL REPORT Nº 2627 TP

LOCATION Entrance to Admiralty Inlet
LAT : 73 ° 52 'N
LONG : 84 ° 35 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.7 M
AFT: 10.7 M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	120	Close pack ice
ICE COVER 1Y 2Y+MY TOT	TENTHS		*	8	
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Pierre Radisson
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE Determine structural response to ice breaking
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis. Alarms set to record impacts >300 με

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☒
INTERVAL= 30 SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS: 66, 75, 92, 93, 110, 127
(SEE APPENDIX A)

VIDEO RECORDING - TAPE Nº:
TIME : TO GMT
PHOTOS = 1
# 2 - 9 TO

COMMENTS
Tape header problem. Data may be inaccessible.

No printout available

VOYAGE RECORDS

INDEX Nº 79-4-16.1
YR.-VOYAGE-TAPE FILE

DATE 24th August 1979

RECORDING TIME 1503:47 TO 1559:49 GMT
ELAPSED TIME 00 H 56 M 02 S

CONTRACTOR: German & Milne Inc.

FINAL REPORT Nº 2627 TP

LOCATION Strathcona Sound

LAT: 73 ° 10 'N
LONG: 85 ° 0 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.7 M
AFT: 11.2 M

CARGO ☒
BALLAST ☐

BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM			120	Very open pack ice. All new ice
ICE COVER: 1Y 1 0 | 2Y+MY 1 3 | TOT 0 3	TENTHS		*	1 0 | 1 3 | 0 3	
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

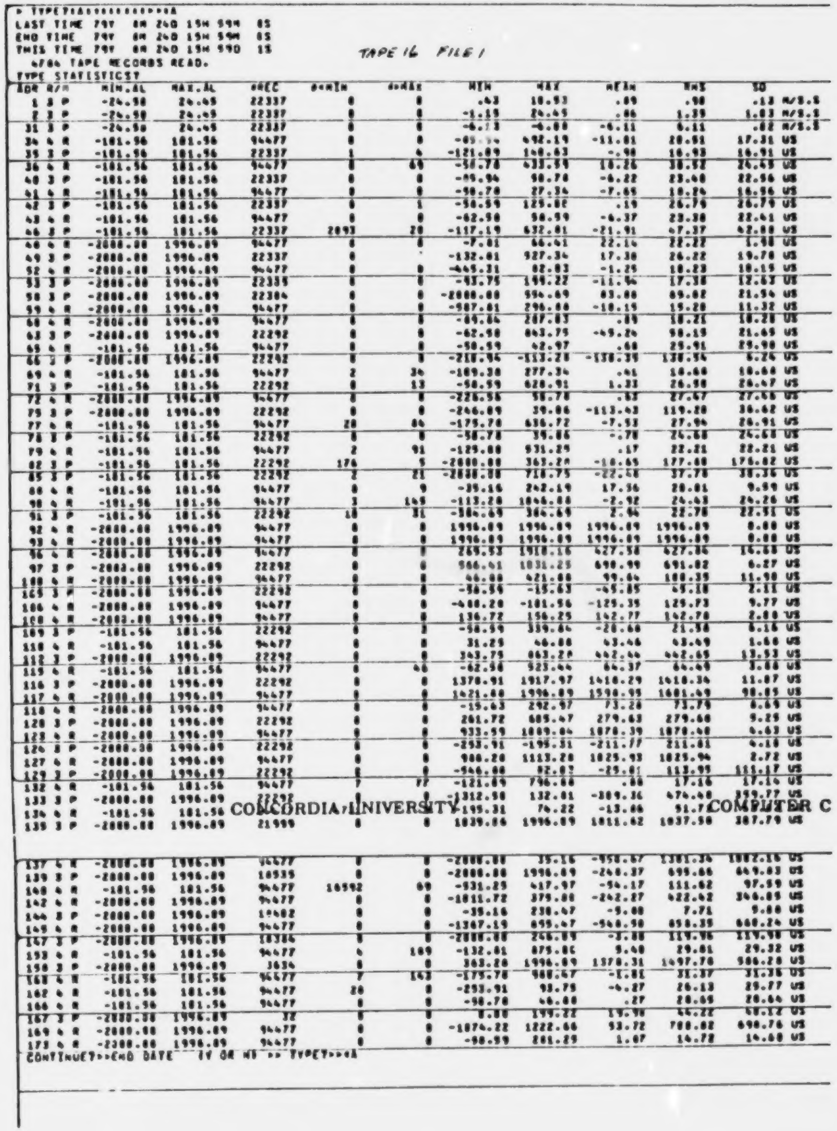
ICEBREAKER SUPPORT ☒
NAME CCGS Labrador
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE Determine structural response to icebreaking
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis. Alarms set to record impacts >50 με

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☒
INTERVAL= 30 SECS
TAPE INFO HEADER ☒
EOF ☐
OMIT CHANNELS: (SEE APPENDIX A) 66, 75, 92, 93, 110, 127

VIDEO RECORDING TAPE Nº: 79-VT2
TIME: 1524 TO 1600 GMT
PHOTOS = 3
# 2 - 10 TO 2 - 12

COMMENTS Actual gauge readings, in Microstrains, are equal to one-half the values on the printout. See Appendix A.



TAPE 16 FILE 1

```
LAST TIME 79Y 8M 24D 15H 59M 8S
END TIME  79Y 8M 24D 15H 59M 8S
THIS TIME 79Y 8M 24D 15H 59D 1S
  4704 TAPE RECORDS READ.
TYPE STATISTICS?
ADR R/M  MIN.AL  MAX.AL  #REC  #<MIN  #>MAX  MIN  MAX  MEAN  RMS  SD
```

CONCORDIA UNIVERSITY COMPUTER C

VOYAGE RECORDS

INDEX Nº 79-4-17.1
YR. – VOYAGE – TAPE FILE

DATE 24th August 1979
RECORDING TIME 1804:44 TO 1918:58 GMT
ELAPSED TIME 01 H 14 M 14 S

CONTRACTOR : German & Milne Inc.
FINAL REPORT Nº 2627 TP

LOCATION Admiralty Inlet
LAT : 73 ° 30 'N
LONG : 85 ° 0 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.7 M
AFT: 11.2 M
CARGO ☒
BALLAST ☐
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	120	Close to very close pack ice
ICE COVER IY | 2Y+MY | TOT	TENTHS		*	8 10	
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

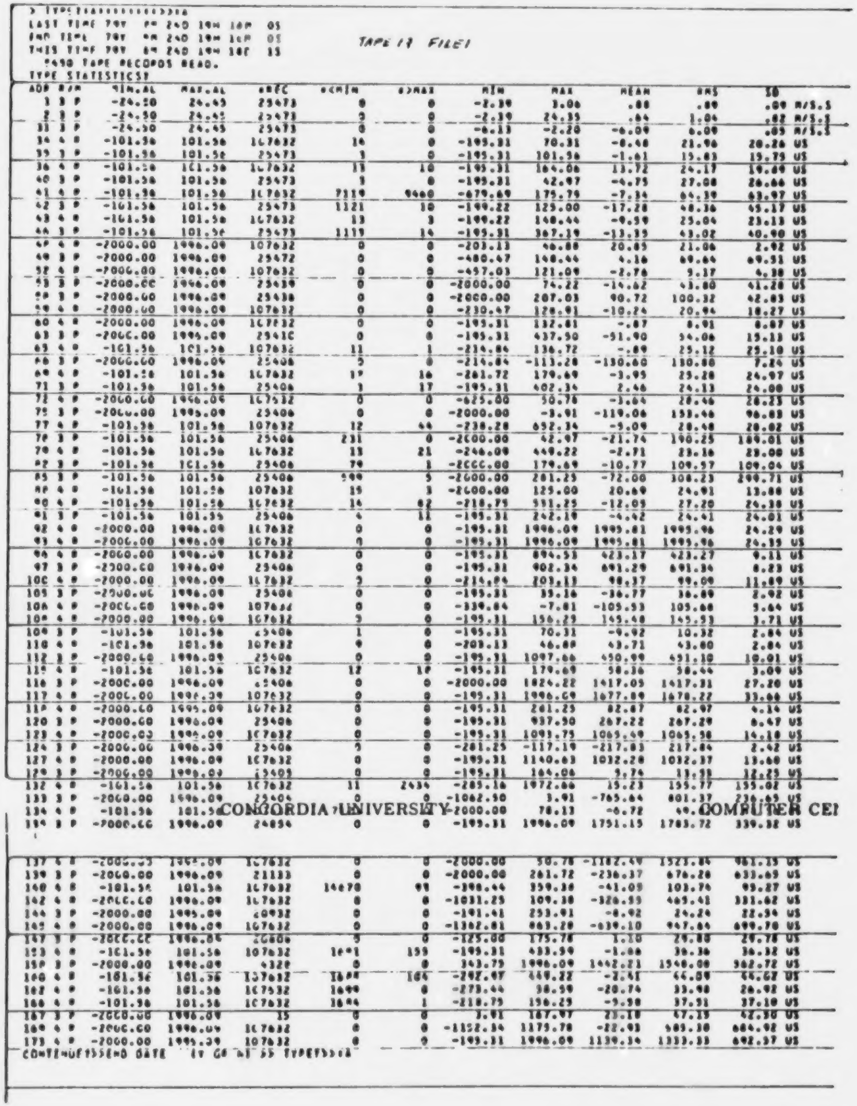
ICEBREAKER SUPPORT ☒
NAME CCGS Labrador
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE Determine structural response to icebreaking
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis. Alarms set to record impacts >50 με

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☒
INTERVAL= 30 SECS
TAPE INFO HEADER ☒
EOF ☐
OMIT CHANNELS: (SEE APPENDIX A) 66, 75, 92, 93, 110, 127

VIDEO RECORDING
TIME : 1804 TO 1919 GMT
TAPE Nº: 79-VT2
PHOTOS = 2
# 2 - 13 TO 2 - 14

COMMENTS Actual gauge readings, in Microstrains, are equal to one-half the values shown on the printout. See Appendix A.



TAPE 17 FILE1

```
> TYPE(TAPE...........)>>A
LAST TIME 79Y  8M 24D 19H 18M  0S
END TIME  79Y  8M 24D 19H 18M  0S
THIS TIME 79Y  8M 24D 19H 18M  1S
  7490 TAPE RECORDS READ.
TYPE STATISTICS?
ADR R/M   MIN.AL   MAX.AL    #REC   #<MIN   #>MAX       MIN      MAX      MEAN      RMS       SD
  1 3 P   -24.50    24.45   25473       0       0     -2.39     3.06       .08      .89      .09 M/S.S
  2 3 P   -24.50    24.45   25473       0       0     -2.39    24.35       .64     1.04      .82 M/S.S
 33 3 P   -24.50    24.45   25473       0       0     -6.13    -2.20     -6.09     6.09      .05 M/S.S
 34 4 B  -101.56   101.56  167632      16       0   -195.31    70.31     -8.48    21.96    20.26 US
 35 3 P  -101.56   101.56   25473       1       0   -195.31   101.56     -1.61    15.83    15.75 US
 36 4 B  -101.56   101.56  167632      13      10   -195.31   164.06     13.72    24.17    19.89 US
 40 3 P  -101.56   101.56   25473       1       0   -195.31    42.97     -4.75    27.08    26.66 US
 41 4 B  -101.56   101.56  167632    7119    9460   -679.69   175.79     -7.34    64.39    63.97 US
 42 3 P  -101.56   101.56   25473    1121      10   -199.22   125.00    -17.28    48.36    45.17 US
 43 4 B  -101.56   101.56  167632      13       3   -199.22   148.44     -9.59    25.04    23.13 US
 44 3 P  -101.56   101.56   25473    1119      14   -195.31   367.19    -13.35    43.02    40.90 US
 48 4 B -2000.00  1996.09  167632       0       0   -203.13    46.88     20.85    21.06     2.92 US
 49 3 P -2000.00  1996.09   25472       0       0   -480.47   148.44      4.16    69.64    69.51 US
 52 4 B -2000.00  1996.09  167632       0       0   -457.03   121.09     -2.76     9.17     4.38 US
 53 3 P -2000.00  1996.09   25439       0       0  -2000.00    74.22    -14.62    43.80    41.28 US
 58 3 P -2000.00  1996.09   25438       0       0  -2000.00   207.03     90.72   100.32    42.83 US
 59 4 B -2000.00  1996.09  167632       0       0   -230.47   128.91    -10.24    20.94    18.27 US
 60 4 B -2000.00  1996.09  167632       0       0   -195.31   132.81      -.87     8.91     8.87 US
 63 3 P -2000.00  1995.09   25410       0       0   -195.31   437.50    -51.90    54.06    15.13 US
 65 4 B  -101.56   101.56  167632      11       1   -214.84   136.72      -.89    25.12    25.10 US
 66 3 P -2000.00  1996.09   25406       5       0   -214.84  -113.28   -130.60   130.80     7.24 US
 69 4 B  -101.56   101.56  167632      17      16   -261.72   179.69     -3.95    25.28    24.97 US
 71 3 P  -101.56   101.56   25406       1      17   -195.31   402.34      2.46    24.13    24.00 US
 72 4 B -2000.00  1996.09  167632       0       0   -625.00    50.78     -3.64    28.46    28.23 US
 75 3 P -2000.00  1995.09   25406       0       0  -2000.00    -3.91   -119.06   153.46    96.83 US
 77 4 B  -101.56   101.56  167632      12      44   -238.28   652.34     -5.09    28.48    28.02 US
 78 3 P  -101.56   101.56   25406     231       0  -2000.00    42.97    -21.74   190.25   189.01 US
 79 4 B  -101.56   101.56  167632      13      21   -246.09   449.22     -2.71    23.16    23.00 US
 82 3 P  -101.56   101.56   25406      79       1  -2000.00   179.69    -10.77   109.57   109.04 US
 85 3 P  -101.56   101.56   25406     599       5  -2000.00   281.25    -72.00   308.23   299.71 US
 88 4 B  -101.56   101.56  167632      15       3  -2000.00   125.00     20.69    24.91    13.88 US
 90 4 B  -101.56   101.56  167632      14      82   -218.75   531.25    -12.05    27.20    24.38 US
 91 3 P  -101.56   101.55   25406       4      11   -195.31   242.19     -4.42    24.41    24.01 US
 92 4 B -2000.00  1996.09  167632       0       0   -195.31  1996.09   1995.81  1995.96    24.29 US
 93 4 B -2000.00  1996.09  167632       0       0   -195.31  1996.09   1995.81  1995.96    24.35 US
 96 4 B -2000.00  1996.09  167632       0       0   -195.31   894.53    423.17   423.27     9.11 US
 97 3 P -2000.00  1996.09   25406       0       0   -195.31   902.34    691.29   691.34     8.23 US
100 4 B -2000.00  1996.09  167632       5       0   -214.84   203.13     98.37    99.00    11.09 US
105 3 P -2000.00  1996.09   25406       0       0   -195.31    35.16    -36.77    36.89     2.92 US
106 4 B -2000.00  1996.09  167632       0       0   -339.84    -7.81   -105.53   105.68     5.64 US
108 4 B -2000.00  1996.09  167632       5       0   -195.31   156.25    145.48   145.53     3.71 US
109 3 P  -101.56   101.56   25406       1       0   -195.31    70.31     -9.92    10.32     2.84 US
110 4 B  -101.56   101.56  167632       9       0   -203.13    46.88     43.71    43.80     2.84 US
112 3 P -2000.00  1996.09   25406       0       0   -195.31  1097.66    450.99   451.10    10.01 US
115 4 B  -101.56   101.56  167632      12      18   -195.31   179.69     58.36    58.44     3.09 US
116 3 P -2000.00  1996.09   25406       0       0  -2000.00  1824.22   1417.05  1417.31    27.20 US
117 4 B -2000.00  1996.39  167632       0       0   -195.31  1996.09   1677.89  1678.22    33.08 US
118 4 B -2000.00  1995.09  167632       0       0   -195.31   281.25     82.87    82.97     4.14 US
120 3 P -2000.00  1996.09   25406       0       0   -195.31   937.50    267.22   267.29     6.47 US
123 4 B -2000.00  1995.09  167632       0       0   -195.31  1093.75   1065.49  1065.58    14.18 US
124 3 P -2000.00  1996.39   25406       5       0   -281.25  -117.19   -217.83   217.84     2.42 US
127 4 B -2000.00  1996.09  167632       0       0   -195.31  1140.63   1032.28  1032.37    13.60 US
129 3 P -2000.00  1996.09   25405       0       0   -195.31   164.06      9.76    11.98    12.23 US
132 4 B  -101.56   101.56  167632      11    2434   -285.16  1972.66     15.23   155.77   155.02 US
133 3 P -2000.00  1996.09   25406       0       0  -1062.50     3.91   -765.64   801.37   236.65 US
134 4 B  -101.56   101.56 [illegible]             -2000.00    78.13     -6.72 [illegible]
135 3 P -2000.00  1996.09   24834       0       0   -195.31  1996.09   1751.15  1783.72   339.38 US

137 4 B -2000.00  1996.09  167632       0       0  -2000.00    50.78  -1182.49  1523.84   961.15 US
139 3 P -2000.00  1996.09   21133       0       0  -2000.00   261.72   -236.37   676.28   633.69 US
140 4 B  -101.56   101.56  167632   14670      99   -398.44   359.38    -41.09   103.76    95.27 US
142 4 B -2000.00  1996.09  167632       0       0  -1031.25   109.38   -326.55   465.42   331.62 US
144 3 P -2000.00  1995.09   20932       0       0   -191.41   253.91     -8.92    24.24    22.54 US
145 4 B -2000.00  1996.09  167632       0       0  -1382.81   863.28   -639.10   947.84   699.70 US
147 3 P -2000.00  1996.09   26606       5       0   -125.00   175.78      1.10    29.80    29.78 US
153 4 B  -101.56   101.56  167632    1691     155   -195.31   433.59     -1.08    36.36    36.32 US
158 3 P -2000.00  1996.09    6328       0       0    343.75  1996.09   1442.21  1548.00   562.72 US
160 4 B  -101.56   101.56  167632    1684     164   -292.97   449.22     -2.41    66.09    66.62 US
162 4 B  -101.56   101.56  167632    1699       0   -273.44    58.59    -20.74    33.98    26.92 US
166 4 B  -101.56   101.56  167632    1694       1   -218.75   156.25     -9.98    37.91    37.10 US
167 3 P -2000.00  1996.09      15       0       0      3.91   187.97     23.18    67.15    62.98 US
169 4 B -2000.00  1996.09  167632       0       0  -1152.34  1175.78    -22.93   585.38   684.92 US
173 4 B -2000.00  1995.39  167632       0       0   -195.31  1996.09   1139.34  1333.33   692.37 US
CONTINUE?S>END DATE  (Y OR N) ?S TYPE?S>IA
```

CONCORDIA UNIVERSITY COMPUTER CE

VOYAGE RECORDS

INDEX Nº 79-4-18.1
YR.–VOYAGE–TAPE FILE

DATE 24th August 1979 RECORDING TIME 1938:21 TO 2056:00 GMT
ELAPSED TIME 01 H 17 M 39 S

CONTRACTOR: German & Milne Inc.
FINAL REPORT Nº 2627 TP

LOCATION Admiralty Inlet
LAT: 73 ° 42 ′N
LONG: 84 ° 48 ′W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.7 M CARGO ☒ BUBBLER ON ☐
AFT: 11.2 M BALLAST ☐ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM			120	Very open pack to close pack ice
ICE COVER 1Y / 2Y+MY / TOT	TENTHS		*	1 – 10	
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*		*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Labrador
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE Determine structural response to ice breaking

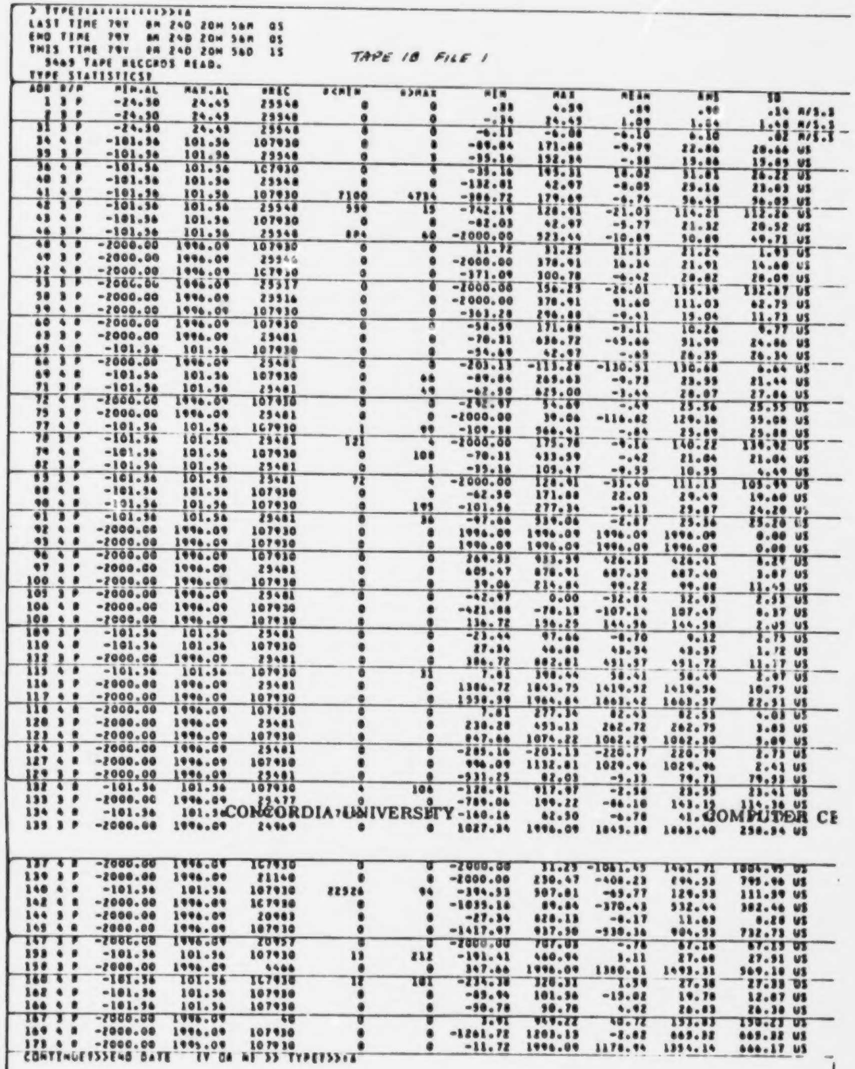
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis. Alarms set to record impacts >50 με

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☒ INTERVAL= 30 SECS
TAPE INFO HEADER ☒ EOF ☐
OMIT CHANNELS: (SEE APPENDIX A) 66, 75, 92, 93, 110, 127

VIDEO RECORDING – TAPE Nº:
TIME: TO GMT
PHOTOS = 2
# 2 - 15 TO 2 - 16

COMMENTS Actual gauge readings, in Microstrains, are equal to one-half the values on the printout. See Appendix A.



```
LAST TIME 79Y 8M 24D 20H 56M 0S
END TIME  79Y 8M 24D 20H 56M 0S
THIS TIME 79Y 8M 24D 20H 56D 1S
  5465 TAPE RECORDS READ.
TYPE STATISTICS?
ADD B/P    MIN.AL     MAX.AL     #REC     #<MIN     #>MAX     MIN     MAX     MEAN     RMS     SD
```

TAPE 18 FILE 1

CONCORDIA UNIVERSITY COMPUTER CE

VOYAGE RECORDS

INDEX Nº 79-4-19.1
YR. – VOYAGE – TAPE FILE

DATE 24th-25th August 1979

RECORDING TIME 2308:18 TO 0121:00 GMT
ELAPSED TIME 02 H 12 M 42 S

CONTRACTOR: German & Milne Inc.

FINAL REPORT Nº 2627 TP

LOCATION Lancaster Sound

LAT: 74 ° 0 'N
LONG: 84 ° 6 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.7 M
AFT: 11.2 M
CARGO ☑
BALLAST ☐
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				
ICE COVER 1Y / 2Y+MY / TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				*
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE Determine structural responses in open water.

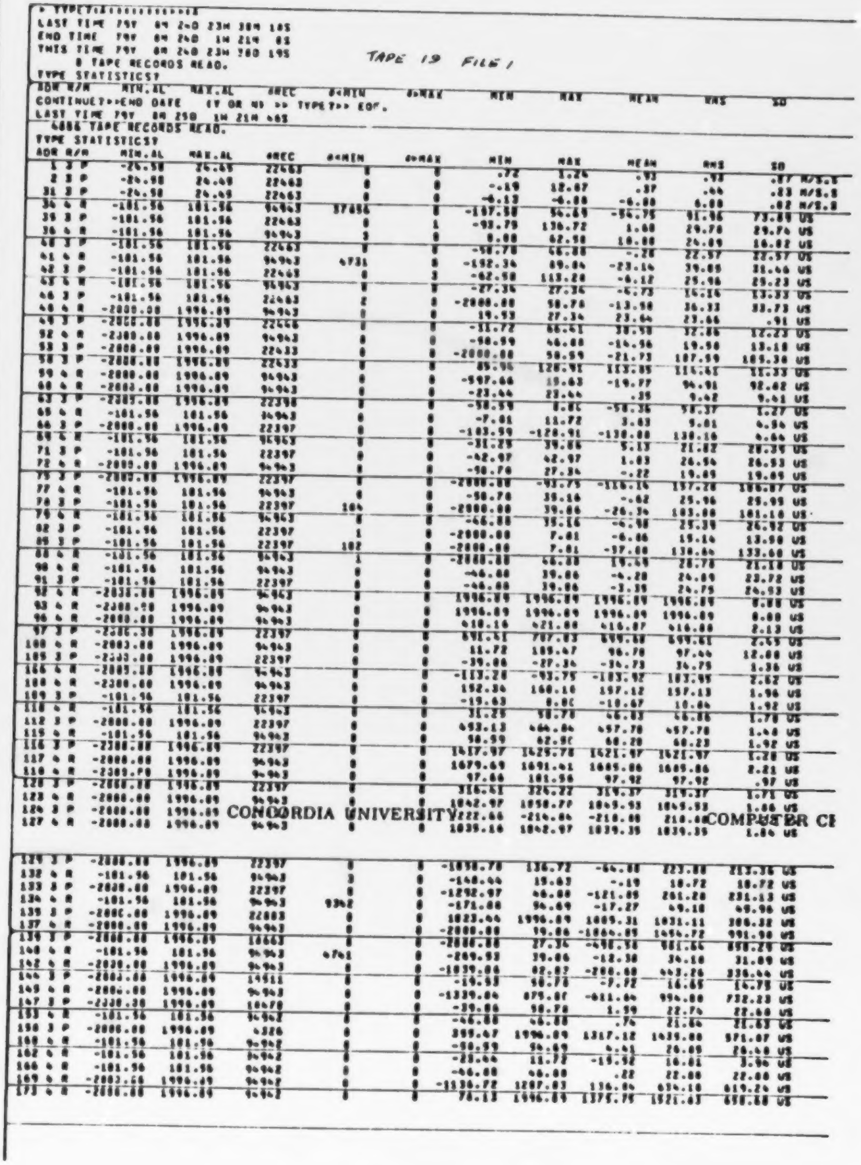
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis. Alarms set to record impacts >50 με

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☒
INTERVAL= 15 SECS
TAPE INFO HEADER ☒ EOF ☒
OMIT CHANNELS: (SEE APPENDIX A) 66, 75, 92, 93, 110, 127

VIDEO RECORDING TAPE Nº:
TIME: TO GMT
PHOTOS =
TO

COMMENTS Actual gauge readings in Microstrains, are equal to one-half the values on the printout. See Appendix A.



TAPE 19 FILE 1

TYPE STATISTICS?

ADR R/M MIN.AL MAX.AL #REC #<MIN #>MAX MIN MAX MEAN RMS SD

CONCORDIA UNIVERSITY COMPUTER CE

VOYAGE RECORDS

INDEX Nº 79-4-20.1
YR. - VOYAGE - TAPE FILE

DATE 26th August 1979

RECORDING TIME 1744:30 TO 1749:23 GMT
ELAPSED TIME 00 H 04 M 53 S

CONTRACTOR: German & Milne Inc.

FINAL REPORT Nº 2627 TP

LOCATION Baffin Bay
LAT: 69 ° 30 'N
LONG: 60 ° 54 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.7 M
AFT: 11.2 M
CARGO ☒
BALLAST ☐
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				Numerous growlers in vicinity
ICE COVER 1Y 2Y+MY TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				*
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE Determine structural response to random impacts in bergy water.

REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis.

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☒
INTERVAL= 15 SECS
TAPE INFO HEADER ☐
EOF ☒
OMIT CHANNELS: (SEE APPENDIX A) 66, 75, 83, 92, 93, 110, 127

VIDEO RECORDING TAPE Nº:
TIME: TO GMT
PHOTOS = -
# TO

COMMENTS Actual gauge readings, in microstrains, are equal to one-half the values on the printouts. See Appendix A.

TAPE 20 FILE 1

```
EOF.
LAST TIME 79Y  8M 26D 17H 47M 45S
   268 TAPE RECORDS READ.
TYPE STATISTICS?
? AL
ADR R/N     MIN.AL    MAX.AL    #REC   #-MIN   # MAX      MIN      MAX     MEAN      RMS        SD
  1 3 P       -.96     12.87    1251       0       0      .29     1.10      .58      .59      .13 M/S.S
  2 3 P     -21.10      4.59    1251       0       0     -.48     2.68      .35      .45      .28 M/S.S
 31 3 P        .05     -4.98    1251    1251       0    -5.74    -5.74    -5.74     5.74      .00 M/S.S
 34 4 R     308.59    597.66    5292    5292       0   -11.72     3.91    -2.57     4.67     3.89 US
 35 3 P     -11.72     11.72    1251       0       0     7.81    15.63    10.00    10.19     1.99 US
 36 4 R     343.75    625.00    5292    5292       0    -7.81    39.06    24.95    25.99     7.29 US
 40 3 P     359.38    648.44    1251    1251       0   -23.44    19.53      .93    14.74    14.71 US
 41 4 R    1042.97     -3.91    5292    5292    2935   -35.16    11.72    -2.31     9.03     8.73 US
 42 3 P     363.28    660.16    1251    1251       0   -23.44    19.53   -18.10    18.33     2.91 US
 43 4 R    1054.69    687.50    5292    5292       0   -15.63     0.00    -8.40     9.17     3.68 US
 46 3 P     390.63  -1515.63    1251    1251    1251   -35.16    19.53   -17.50    22.58    14.28 US
 48 4 R     414.06  -1496.09    5292    5292    5292    11.72    15.63    15.23    15.27     1.18 US
 49 3 P     -58.59     19.53    1250       0    1115    11.72    46.88    31.01    32.18     8.61 US
 52 4 R     429.69  -1472.66    5292    5292    5292   -27.34    -7.81   -18.98    20.15     6.78 US
, 53 3 P     23.44   1066.41    1249    1249       0  -136.72    19.53   -13.96    43.34    41.05 US
 58 3 P     460.94  -1425.78    1249    1249    1249   167.97   183.59   175.26   175.29     3.30 US
 59 4 R      42.97     -3.91    5292    5292    2355   -11.72     3.91    -5.20     8.96     7.29 US
 60 4 R     480.47    132.81    5292    5292       0   -15.63     3.91    -1.67     5.04     4.76 US
 63 3 P     613.28     27.34    1249    1249       1   -35.16    62.50   -29.07    29.32     3.80 US
 65 4 R       3.91    -11.72    5292    2837    5292    -7.81    19.53     6.60    10.69     8.41 US
 66 3 P     523.44    167.97    1249    1249       0  -113.28   -74.22   -80.11    80.28     5.24 US
 69 4 R       3.91     15.63    5292    2941       0   -15.63    11.72    -1.56     8.83     8.69 US
 71 3 P    -246.09    -11.72    1249       0    1249    -7.81    11.72     3.03     8.52     7.96 US
 72 4 R     554.69    230.47    5292    5292       0    -3.91     7.81      .54     2.67     2.61 US
 75 3 P   -1050.78      0.00    1249       0       0  -179.69   -54.69   -73.88    82.32    36.31 US
 77 4 R      11.72      0.00    5292    2439    2940   -23.44    19.53    -1.15    17.32    17.28 US
 78 3 P     625.00    269.53    1249    1249       0   -27.34    27.34     2.59    23.84    23.70 US
 79 4 R       0.00      7.81    5292    2354    2847   -15.63    19.53     2.78    13.38    13.09 US
 83 3 P      -3.91    -23.44    1249    1249       0  -199.22   -74.22  -104.73   114.52    46.33 US
 85 3 P     691.41    -11.72    1249    1249     332   -35.16     3.91   -17.95    20.96    10.82 US
 88 4 R   -1667.97    351.56    5292       0       0   -11.72    15.63     4.35    11.75    10.92 US
 90 4 R   -1644.53    359.38    5292       0       0   -19.53    15.63     3.25     8.85     8.24 US
 91 3 P      15.63   1042.97    1249    1249       0   -27.34     7.81   -20.66    21.59     6.26 US
 92 4 R   -1621.09    363.28    5292       6    5292  1027.34  1046.88  1041.40  1041.41     2.39 US
 93 4 R     445.31   1054.69    5292       0      43  1039.06  1058.59  1051.73  1051.73     3.15 US
 96 4 R   -1574.22    390.63    5292       0       0   300.78   324.22   312.04   312.06     3.29 US
 97 3 P      -7.81     62.50    1249       0    1249   425.78   464.84   444.31   444.36     6.76 US
100 4 R   -1546.88    421.88    5292       0       0    23.44    66.41    59.15    59.70     8.12 US
105 3 P       0.00     35.16    1249     454       0    -7.81     0.00    -2.06     2.85     1.97 US
106 4 R     140.63    457.03    5292    5292       0   -82.03   -46.88   -60.25    60.58     6.28 US
108 4 R     160.16    460.94    5292    5292       0    82.03    89.84    87.01    87.03     1.79 US
109 3 P     -11.72     42.97    1249       1       0   -15.63    -7.81   -10.46    10.62     1.83 US
110 4 R     167.97    480.47    5292    5292       0    15.63    27.34    23.89    23.93     1.34 US
112 3 P     187.50    496.09    1249       0       0   308.59   355.47   322.82   322.90     7.09 US
115 4 R     -11.72      3.91    5292       0    5292    31.25    39.06    36.67    36.72     1.91 US
116 3 P     230.47    523.44    1249       0    1249   843.75   890.63   860.18   860.21     6.52 US
117 4 R       3.91    -31.25    5292       0    5292   667.97   730.47   697.37   697.42     8.18 US
118 4 R     234.38    535.16    5292    5292       0    42.97    50.78    44.78    44.82     1.95 US
120 3 P     253.91    546.88    1249    1249       0   203.13   230.47   214.76   214.81     4.62 US
123 4 R       7.81   -414.06    5292       0    5292   597.66   640.63   609.40   609.40     2.99 US
124 3 P     281.25    566.41    1249    1249       0  -164.06  -144.53  -153.95   154.00     3.83 US
127 4 R     -23.44      7.81    5292       0    5292   601.56   644.53   614.07   614.08     2.81 US
129 3 P     -11.72      0.00    1249       0    1249    11.72    23.44    19.13    19.20     1.62 US
132 4 R     351.56    648.44    5292    5292       0   -11.72    11.72     4.30     5.00     2.55 US
133 3 P       0.00     -3.91    1249     492     537   -74.22     3.91   -10.32    24.42    22.14 US
134 4 R     359.38    660.16    5292    5292       0   -35.16    19.53    -5.83    25.63    24.96 US
135 3 P    1042.97    691.41    1215       0    1215  1050.78  1070.31  1060.10  1060.11     4.43 US
137 4 R    1050.78   1085.94    5292    5292       0 -1101.56    15.63     6.86    31.77    31.03 US
139 3 P     316.41     50.78    1032    1032       0   -11.72    19.53      .58    11.08    11.07 US
140 4 R     390.63  -1992.19    5292    5292    5292  -253.91     0.00  -221.06   232.72    66.36 US
142 4 R     414.06  -1878.91    5292    5292    5292  -593.75     0.00  -465.74   483.13   128.46 US
144 3 P     421.88  -1863.28    1029    1029    1029     0.00     7.81     1.67     2.56     1.94 US
145 4 R      85.94     11.72    5292    2927    2365 -1058.59   359.38  -315.09   740.93   670.65 US
147 3 P      23.44     -7.81    1028     599    1004   -11.72    27.34    10.84    16.38    12.28 US
153 4 R      42.97     35.16    5292    5292       0    -7.81    19.53    11.13    11.74     3.73 US
158 2 R     515.63    160.16     141      20     141   425.78  1054.69   899.91   926.66   221.06 US
160 4 R     523.44    167.97    5292    5292       0   -35.16    15.63   -10.81    16.79    12.85 US
162 4 R     535.16    187.50    5292    5292       0   -23.44     3.91   -11.16    16.21    10.34 US
166 4 R     554.69    230.47    5292    5292       0   -27.34     3.91   -10.86    13.76     8.45 US
167 1 R    -410.16      0.00       3       0       0    -3.91     0.00    -2.60     3.19     2.26 US
169 4 R   -1054.69      0.00    5292       0    4717  -515.63   699.22   371.78   497.36   330.40 US
173 4 R       0.00      7.81    5292       0    5292   640.63  1085.94   940.72   953.23   153.93 US
```

VOYAGE RECORDS

INDEX Nº 79-4-20.2
YR. - VOYAGE - TAPE FILE

DATE 26th August 1979
RECORDING TIME 1753:50 TO 2229:22 GMT
ELAPSED TIME 04 H 35 M 32 S

CONTRACTOR : German & Milne Inc.
FINAL REPORT Nº 2627 TP

LOCATION Baffin Bay
LAT : 69 ° 30 'N
LONG : 60 ° 54 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.7 M
AFT: 11.2 M
CARGO ☒ BALLAST ☐
BUBBLER ON ☐ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				Numerous growlers in vicinity.
ICE COVER 1Y 2Y+MY TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				*
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE Determine structural response to random impacts in bergy water.
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis. Alarms set to record impacts >100 με

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☒ INTERVAL= 15 SECS
TAPE INFO HEADER ☒ EOF ☒
OMIT CHANNELS: (SEE APPENDIX A) 66, 75, 83, 92, 93, 110, 127

VIDEO RECORDING - TAPE Nº:
TIME : TO GMT
PHOTOS = -
# TO

COMMENTS Actual gauge readings, in Microstrains, are equal to one-half the values on the printout. See Appendix A.

TAPE 20 FILE 2

```
EOF.
LAST TIME 79Y  8M 26D 22H 27M 58S
  4461 TAPE RECORDS READ.
TYPE STATISTICS?
? AL
ADR R/M   MIN.AL    MAX.AL    #REC     #<MIN     #>MAX       MIN       MAX      MEAN       RMS        SD
  1 3 P   -24.50     24.45    20840        0         0        .14      1.34       .60       .61       .13 M/S.S
  2 3 P   -24.50     24.45    20840        0         0      -1.77      3.78       .35       .58       .46 M/S.S
 31 3 P   -24.50     24.45    20840        0         0      -5.79     -5.74     -5.74      5.74       .00 M/S.S
 34 4 R  -203.13    203.13    88115        0         0     -97.66      3.91     -7.05     10.52      7.80 US
 35 3 P  -203.13    203.13    20840        0         0     -27.34     23.44     -2.01      9.69      9.48 US
 36 4 R  -203.13    203.13    88115        0         0     -11.72     35.16      8.36     10.77      6.79 US
 40 3 P  -203.13    203.13    20840        0         0     -31.25     27.34      2.85     13.07     12.76 US
 41 4 R  -203.13    203.13    88115     2338         0    -402.34     89.84    -15.65     59.84     57.75 US
 42 3 P  -203.13    203.13    20840      559         0    -281.25     70.31     -9.68     48.17     47.19 US
 43 4 R  -203.13    203.13    88115        0         0     -27.34     19.53      4.50      9.01      7.76 US
 46 3 P  -203.13    203.13    20840        0         0     -89.84     31.25     -8.74     21.40     19.54 US
 48 4 R -2000.00   1996.09    88115        0         0      11.72     19.53     15.14     15.22      1.63 US
 49 3 P -2000.00   1996.09    20839        0         0       3.91     50.78     30.22     31.41      8.57 US
 52 4 R -2000.00   1996.09    88115        0         0     -35.16      3.91    -12.54     13.98      6.19 US
 53 3 P -2000.00   1996.09    20810        0         0    -187.50     46.88    -10.15     28.22     26.33 US
 58 3 P -2000.00   1996.09    20810        0         0     160.16    207.03    186.45    186.64      8.44 US
 59 4 R -2000.00   1996.09    88115        0         0    -343.75      7.81     -8.54     31.09     29.80 US
 60 4 R -2000.00   1996.09    88115        0         0     -15.63     15.63      -.46      4.81      4.79 US
 63 3 P -2000.00   1996.09    20781        0         0     -39.06    105.47    -29.19     29.43      3.69 US
 65 4 R  -203.13    203.13    88115        0         0     -27.34     31.25      1.99      9.74      9.54 US
 66 3 P -2000.00   1996.09    20781        0         0    -113.28    -74.22    -80.03     80.17      4.77 US
 69 4 R  -203.13    203.13    88115        0         0     -23.44     19.53     -1.95      9.59      9.39 US
 71 3 P  -203.13    203.13    20781        0         0     -27.34     27.34     -2.10     12.50     12.33 US
 72 4 R -2000.00   1996.09    88115        0         0     -23.44     19.53     -1.90     11.09     10.93 US
 75 3 P -2000.00   1996.09    20781        0         0    -183.59    -54.69    -73.15     80.85     34.43 US
 77 4 R  -203.13    203.13    88115        0         0     -23.44     31.25      2.25     16.41     16.26 US
 78 3 P  -203.13    203.13    20781        0         0     -23.44     31.25       .75     14.37     14.35 US
 79 4 R  -203.13    203.13    88115        0         0     -35.16     19.53     -3.55     13.52     13.04 US
 83 3 P -2000.00   1996.09    20781        0         0    -199.22    -74.22   -107.50    117.35     47.06 US
 85 3 P  -203.13    203.13    20781        0         0     -46.88     31.25    -14.67     19.90     13.46 US
 88 4 R  -203.13    203.13    88115        0         0     -19.53     35.16      9.18     15.64     12.66 US
 90 4 R  -203.13    203.13    88115        0         0     -31.25     23.44     -4.50     14.12     13.39 US
 91 3 P  -203.13    203.13    20781        0         0     -31.25     27.34     -4.98     15.42     14.59 US
 92 4 R -2000.00   1996.09    88115        0         0    1035.16   1046.88   1041.47   1041.47      2.34 US
 93 4 R -2000.00   1996.09    88115        0         0    1042.97   1058.59   1051.99   1051.99      3.10 US
 96 4 R -2000.00   1996.09    88115        0         0     292.97    324.22    310.45    310.51      6.09 US
 97 3 P -2000.00   1996.09    20781        0         0     421.88    464.84    443.04    443.09      6.84 US
100 4 R -2000.00   1996.09    88115        0         0      23.44     66.41     59.03     59.57      8.00 US
105 3 P -2000.00   1996.09    20781        0         0     -11.72      0.00     -6.12      7.25      3.88 US
106 4 R -2000.00   1996.09    88115        0         0     -89.84    -46.88    -64.40     64.80      7.23 US
108 4 R -2000.00   1996.09    88115        0         0      82.03     97.66     89.29     89.31      2.02 US
109 3 P  -203.13    203.13    20781        0         0     -15.63     -3.91    -10.57     10.75      1.97 US
110 4 R  -203.13    203.13    88115        0         0      15.63     27.34     24.40     24.47      1.77 US
112 3 P -2000.00   1996.09    20781        0         0     304.69    363.28    325.31    325.40      7.49 US
115 4 R  -203.13    203.13    88115        0         0      23.44     42.97     33.89     34.16      4.28 US
116 3 P -2000.00   1996.09    20781        0         0     839.84    874.53    857.78    857.82      7.54 US
117 4 R -2000.00   1996.09    88115        0         0     578.13    960.94    831.84    835.52     78.32 US
118 4 R -2000.00   1996.09    88115        0         0      39.06     58.59     47.90     48.03      3.44 US
120 3 P -2000.00   1996.09    20781        0         0     195.31    234.38    214.67    214.75      5.79 US
123 4 R -2000.00   1996.09    88115        0         0     597.66    644.53    611.79    611.80      3.00 US
124 3 P -2000.00   1996.09    20781        0         0    -164.06   -140.63   -150.98    151.04      4.29 US
127 4 R -2000.00   1996.09    88115        0         0     605.47    644.53    616.05    616.07      3.86 US
129 3 P -2000.00   1996.09    20781        0         0    -515.63     35.16    -30.15    118.12    114.21 US
132 4 R  -203.13    203.13    88115        0         0     -31.25     19.53     -2.38     13.23     12.98 US
133 3 P -2000.00   1996.09    2078[illegible]        0         0    -644.53     23.44    -62.10    142.70    128.49 US
134 4 R  -203.13    203.13    88115        0         0     -58.59     31.25      3.34     16.04     15.65 US
135 3 P -2000.00   1996.09    20502        0         0     597.66   1085.94    998.71   1005.17    113.82 US
137 4 R -2000.00   1996.09    88115        0         0   -1109.38     15.63   -522.01    755.62    546.32 US
139 3 P -2000.00   1996.09    17241        0         0     -27.34     19.53     -2.39     10.60     10.33 US
140 4 R  -203.13    203.13    88115    61973         0    -382.81     35.16   -202.74    230.74    110.17 US
142 4 R -2000.00   1996.09    88115        0         0    -640.63     42.97   -238.84    334.41    234.06 US
144 3 P -2000.00   1996.09    17165        0         0     -27.34     27.34      2.37      7.72      7.28 US
145 4 R -2000.00   1996.09    88115        0         0   -1058.59    531.25   -296.07    632.37    558.78 US
147 3 P -2000.00   1996.09    17187        0         0   -2000.00     35.16      2.28     19.44     19.31 US
153 4 R  -203.13    203.13    88115        0         0     -31.25     35.16      1.26     16.54     16.49 US
158 3 P -2000.00   1996.09     1884        0         0     285.16   1062.50    760.37    804.75    263.64 US
160 4 R  -203.13    203.13    88115        0         0     -46.88     35.16     -3.72     15.73     15.28 US
162 4 R  -203.13    203.13    88115        0         0     -27.34     31.25       .31     13.67     13.66 US
166 4 R  -203.13    203.13    88115        0         0     -31.25     27.34      1.97     14.22     14.09 US
167 3 P -2000.00   1996.09        2        0         0     -15.63     11.72     -1.95     13.81     19.33 US
169 4 R -2000.00   1996.09    88115        0         0    -695.31    648.44    -84.31    368.47    358.70 US
173 4 R -2000.00   1996.09    88115        0         0     562.50   1089.84    967.03    975.01    124.40 US
```

VOYAGE RECORDS

INDEX Nº 79-5-21.1
YR. - VOYAGE - TAPE FILE

DATE	14th October 1979	RECORDING TIME 0529:27 TO 0620:30 GMT	ELAPSED TIME 00 H 51 M 03 S
CONTRACTOR :	German & Milne Inc.	FINAL REPORT Nº 2627 TP	
LOCATION	Lancaster Sound	LAT : 74 ° 18 'N	LONG : 77 ° 0 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.7 M
AFT: 10.8 M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM					
ICE COVER 1Y 2Y+MY TOT	TENTHS					Small bergy bits
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				*
RAMMING				
ASTERN				
TURNING				

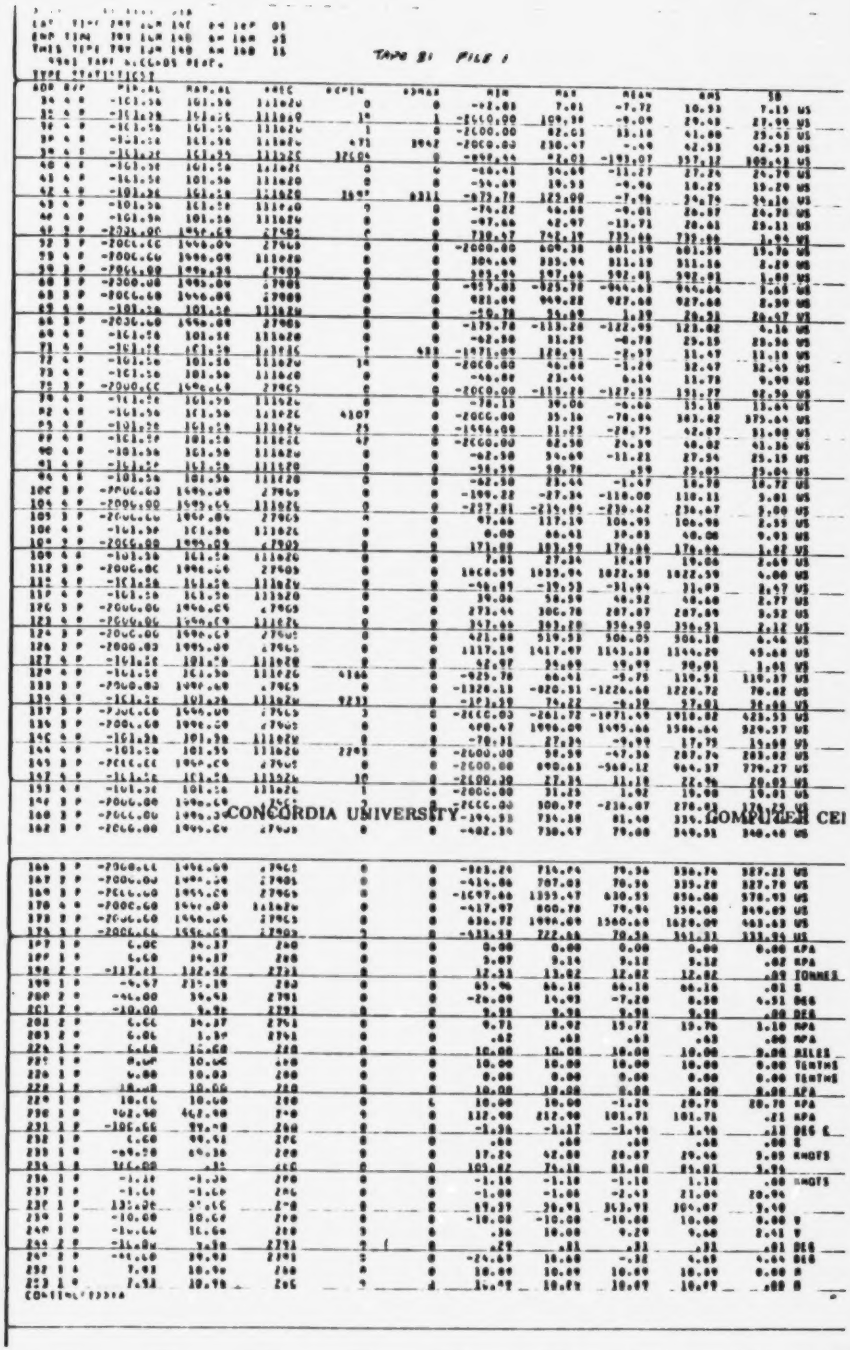
ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE: Determine structural response to random impacts in bergy water.
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis. Alarms set to record impacts >50 με

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☒
INTERVAL= 15 SECS
TAPE INFO HEADER ☒
EOF ☐
OMIT CHANNELS: (SEE APPENDIX A) 66, 75, 127, 156, 198, 203, 236, 239, 240

VIDEO RECORDING - TAPE Nº:
TIME : TO GMT
PHOTOS = -
# TO

COMMENTS Sampling pattern modified so as to fall within limit of 1765 samples per second. Actual gauge readings, in microstrains, are equal to one-half the values on the printout. See Appendix A.


TAPE 81 FILE 1
CONCORDIA UNIVERSITY COMPUTER CE

VOYAGE RECORDS

INDEX Nº 79-5-22.1
YR. - VOYAGE - TAPE FILE

DATE	14th October 1979	RECORDING TIME	0622:42	TO	0712:15 GMT
		ELAPSED TIME	00 H 49 M		33 S

CONTRACTOR: German & Milne Inc.

FINAL REPORT Nº 2627 TP

LOCATION Lancaster Sound

LAT: 74 ° 18 'N
LONG: 77 ° 0 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.7 M AFT: 10.8 M
CARGO ☐ BALLAST ☒
BUBBLER ON ☐ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				Small bergy bits
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				*
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE Determine structural response to random impacts in bergy water.

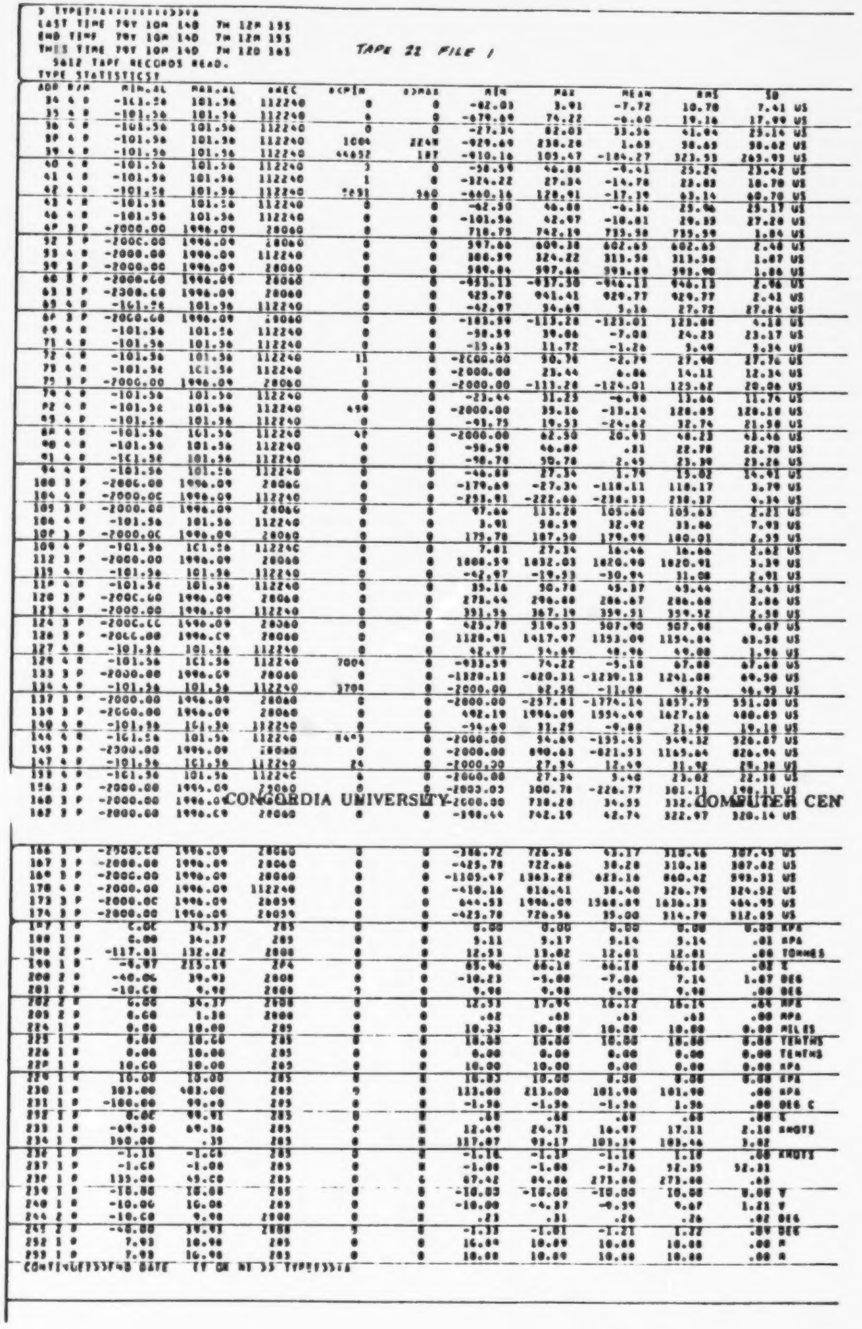
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis. Alarms set to record impacts >50 με

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☒ INTERVAL= 15 SECS
TAPE INFO HEADER ☒ EOF ☐
OMIT CHANNELS: (SEE APPENDIX A) 66, 75, 127, 156, 198, 203, 236, 239, 240

VIDEO RECORDING TAPE Nº:
TIME: TO GMT
PHOTOS = -
# TO

COMMENTS Due to frequent alarms, tape recording is continuous. Actual gauge readings, in microstrains, are equal to one-half the values on the printout. See Appendix A.



TAPE 22 FILE 1

CONCORDIA UNIVERSITY COMPUTER CEN

VOYAGE RECORDS

INDEX Nº 79-5-23.1
YR.-VOYAGE-TAPE FILE

DATE 14th October 1979

RECORDING TIME 1334:20 TO 1431:00 GMT
ELAPSED TIME 00 H 50 M 40 S

CONTRACTOR : German & Milne Inc.

FINAL REPORT Nº 2627 TP

LOCATION Lancaster Sound
LAT : 74 ° 0 'N
LONG : 82 ° 24 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.7 M
AFT: 10.8 M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐ OFF ☒
ERPM = 420

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	15	23	Young, Nilas and Pancake ice
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS		*	1		
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Pierre Radisson
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE Determine structural response to ice breaking.

REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis.

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐
INTERVAL= SECS

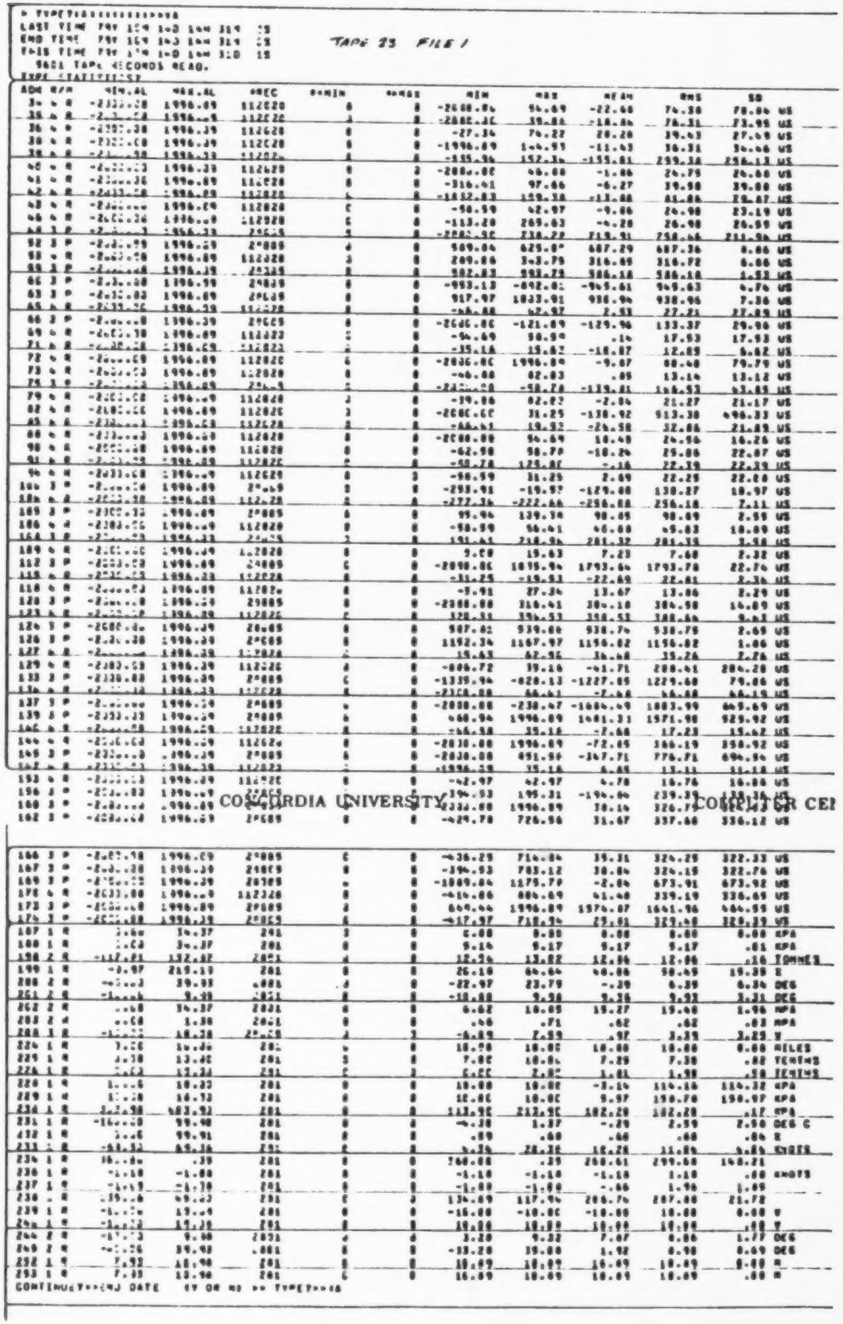
TAPE INFO HEADER ☒ EOF ☐

OMIT CHANNELS: (SEE APPENDIX A) 66, 75, 127, 156, 198, 203, 236, 239, 240

VIDEO RECORDING TAPE Nº:
TIME : TO GMT

PHOTOS = 2
# 2 - 23 TO 3 - 0

COMMENTS Actual gauge readings, in microstrains, are equal to one-half the values shown on the printout. See Appendix A.


TAPE 23 FILE 1

VOYAGE RECORDS

INDEX Nº 79-5-24.1
YR. – VOYAGE – TAPE FILE

DATE 14th October 1979	RECORDING TIME 1707:41	TO 1754:00	GMT	
	ELAPSED TIME 00 H	46 M	19 S	
CONTRACTOR : German & Milne Inc.		FINAL REPORT Nº 2627	TP	
LOCATION Admiralty Inlet	LAT : 73 °	30 'N		
	LONG : 84 °	24 'W		

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 7.5 M CARGO ☐ BUBBLER ON ☐
AFT: 9.6 M BALLAST ☒ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	8	20	Young ice
ICE COVER IY 2Y+MY TOT	TENTHS		*	9 0 9		
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

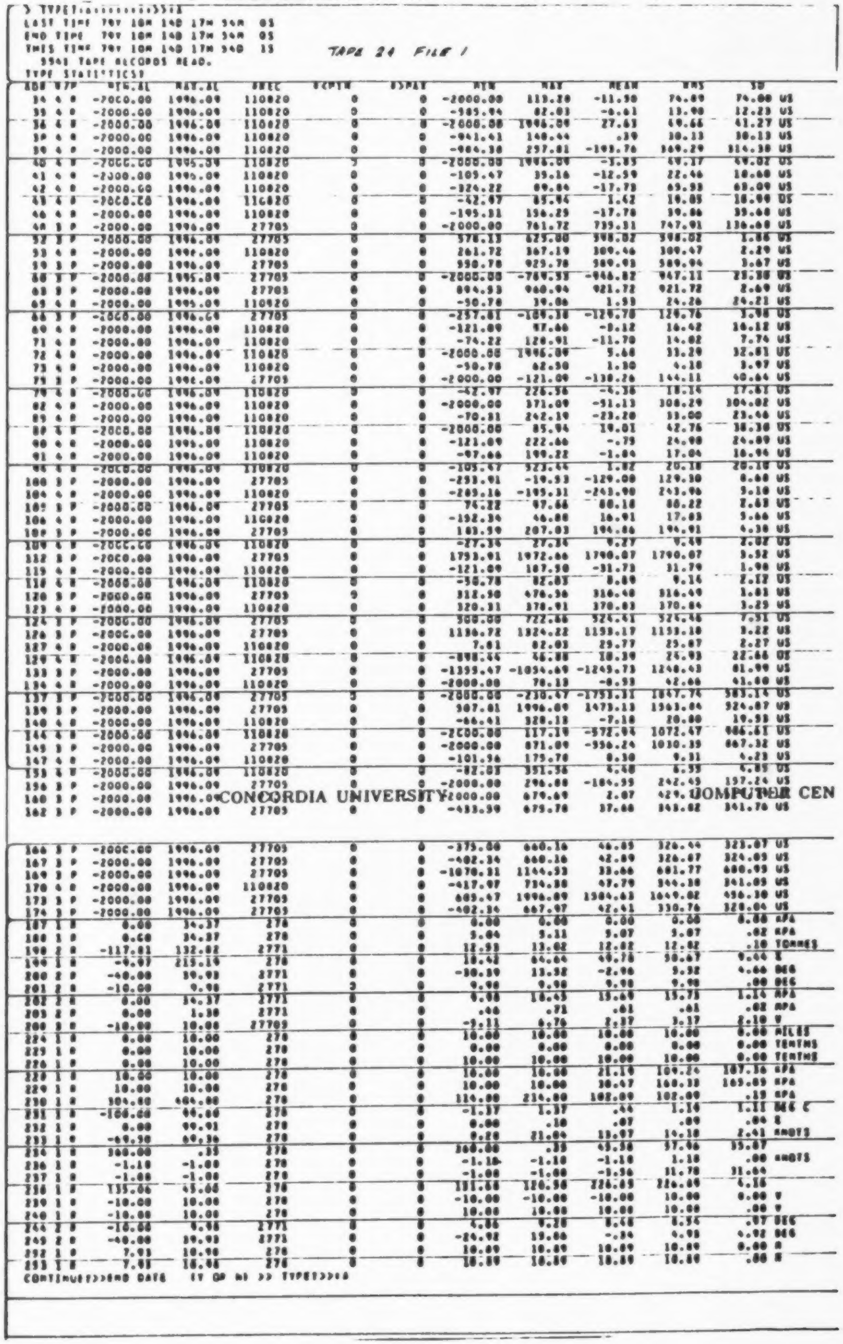
ICEBREAKER SUPPORT ☒
NAME CCGS Pierre Radison
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE Determine structural response to ice breaking.
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis.

RECORDING NOTES
MODE RECORDING ☒
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☒ EOF ☐
OMIT CHANNELS: (SEE APPENDIX A) 66, 75,127,156,198,203,236,239,240

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS = 4
# 3 - 3 TO 3 - 6

COMMENTS Actual gauge readins, in microstrains, are equal to one-half the values on the printout. See Appendix A.


TAPE 24 FILE 1
CONCORDIA UNIVERSITY COMPUTER CEN

VOYAGE RECORDS

INDEX Nº 79-5-25.1
YR.-VOYAGE-TAPE FILE

DATE 14th October 1979

RECORDING TIME 1906:26 TO 1948:00 GMT
ELAPSED TIME 0 H 41 M 34 S

CONTRACTOR : German & Milne Inc.

FINAL REPORT Nº 2627 TP

LOCATION
LAT : 73 ° 12 'N
LONG : 84 ° 48 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 7.5 M
AFT: 9.6 M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM		*			15			20	
ICE COVER 1Y 2Y+MY TOT	TENTHS		*	10	0	10				Young ice
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Pierre Radisson
FOLLOWING ☒
IN ATTENDANCE ☐

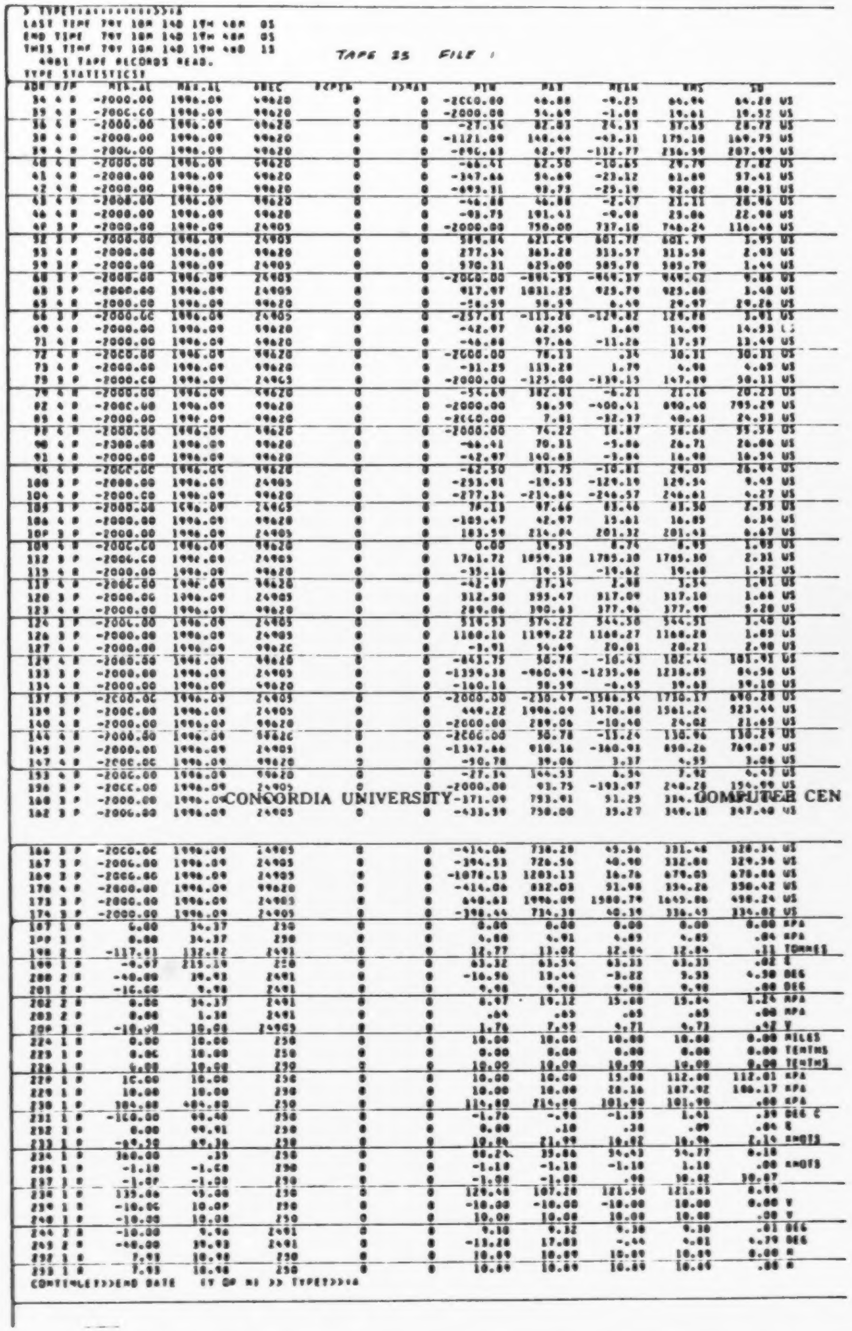
RATIONALE
REASON FOR TAPE Determine structural response to ice breaking.
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis.

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☒
EOF ☐
OMIT CHANNELS: (SEE APPENDIX A) 66,75,127,156,198,203,236,239,240

VIDEO RECORDING - TAPE Nº:
TIME : TO GMT
PHOTOS = -
# TO

COMMENTS Actual gauge readings, in microstrains, are equal to one-half the values on the printout. See Appendix A.


TAPE 25 FILE 1

CONCORDIA UNIVERSITY COMPUTER CEN

VOYAGE RECORDS

INDEX Nº 79-6-26.1
YR.–VOYAGE–TAPE FILE

DATE: 17th October 1979
RECORDING TIME 0209:26 TO 0302:00 GMT
ELAPSED TIME 00 H 52 M 34 S

CONTRACTOR: German & Milne Inc.
FINAL REPORT Nº 2627 TP

LOCATION: Admiralty Inlet
LAT: 73 ° 24 'N
LONG: 85 ° 0 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.1 M
AFT: 11.7 M
CARGO ☒
BALLAST ☐
BUBBLER ON ☐ OFF ☒
ERPM = 420

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	8 – 10	
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS		*	9 0 9	New ice
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*		*	
RAMMING				
ASTERN				
TURNING				

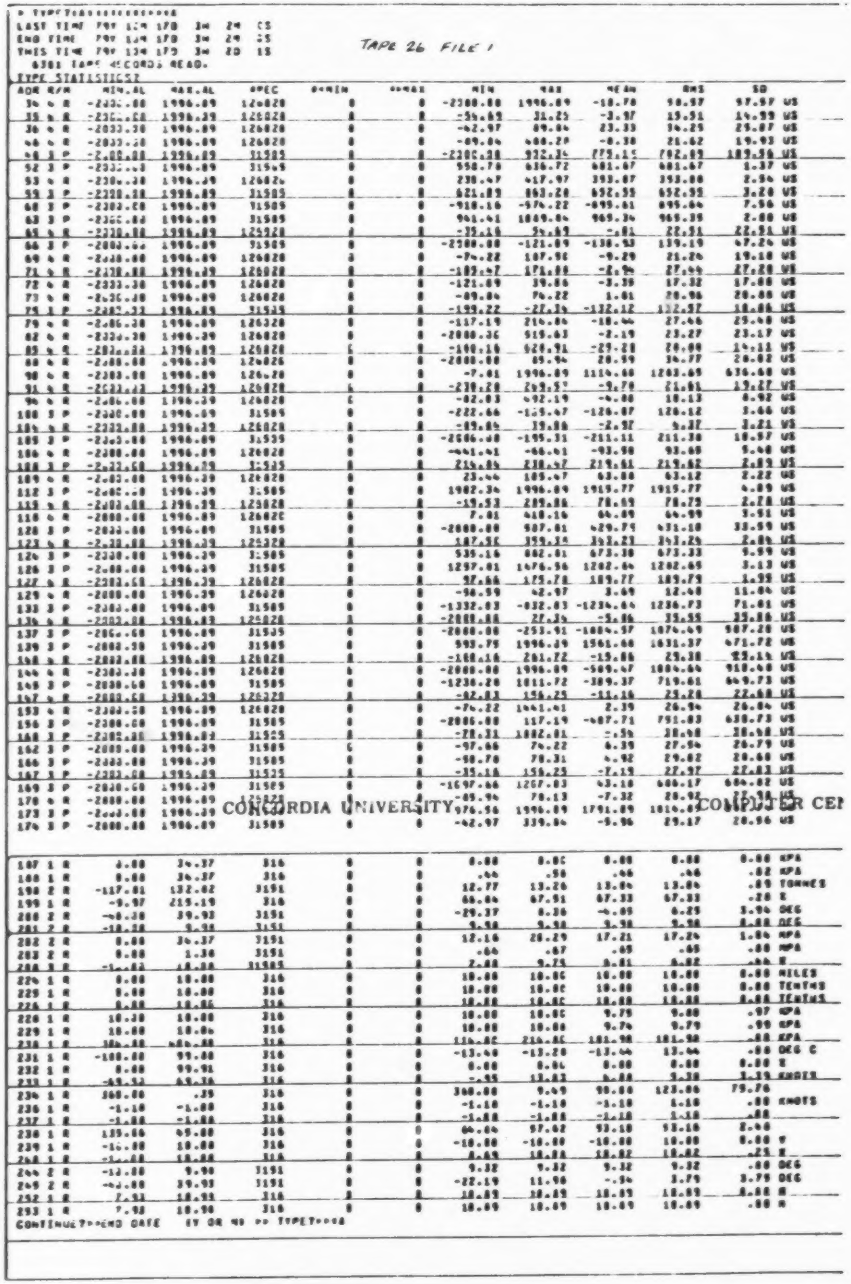
ICEBREAKER SUPPORT ☒
NAME CCGS Pierre Radisson
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE: Determine structural response to ice breaking.
REASON FOR SAMPLING PATTERN: Collect a broad range of data for possible future analysis.

RECORDING NOTES
MODE: RECORDING ☒
STANDBY ☐
INTERVAL= SECS
TAPE INFO: HEADER ☒ EOF ☐
OMIT CHANNELS: (SEE APPENDIX A) 66, 75, 127, 156, 198, 203, 236, 239, 240

VIDEO RECORDING – TAPE Nº:
TIME: TO GMT
PHOTOS = –
# TO

COMMENTS: Due to darkness ship not following precise path of icebreaker and frequently breaks own path. Actual gauge readings, in microstrains, are equal to one-half the values on the printout. See Appendix A.


TAPE 26 FILE 1
CONCORDIA UNIVERSITY COMPUTER CE

VOYAGE RECORDS

INDEX Nº 79-6-27.1
YR.-VOYAGE-TAPE FILE

DATE: 17th October 1979
RECORDING TIME 0303:07 TO 0356:00 GMT
ELAPSED TIME 00 H 52 M 53 S

CONTRACTOR: German & Milne Inc.
FINAL REPORT Nº 2627 TP

LOCATION: Admiralty Inlet
LAT: 73 ° 30 'N
LONG: 84 ° 30 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.1 M
AFT: 11.7 M
CARGO ☒
BALLAST ☐
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	15	20	
ICE COVER 1Y 2Y+MY TOT	TENTHS		*	10		
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*		*	
RAMMING				
ASTERN				
TURNING				

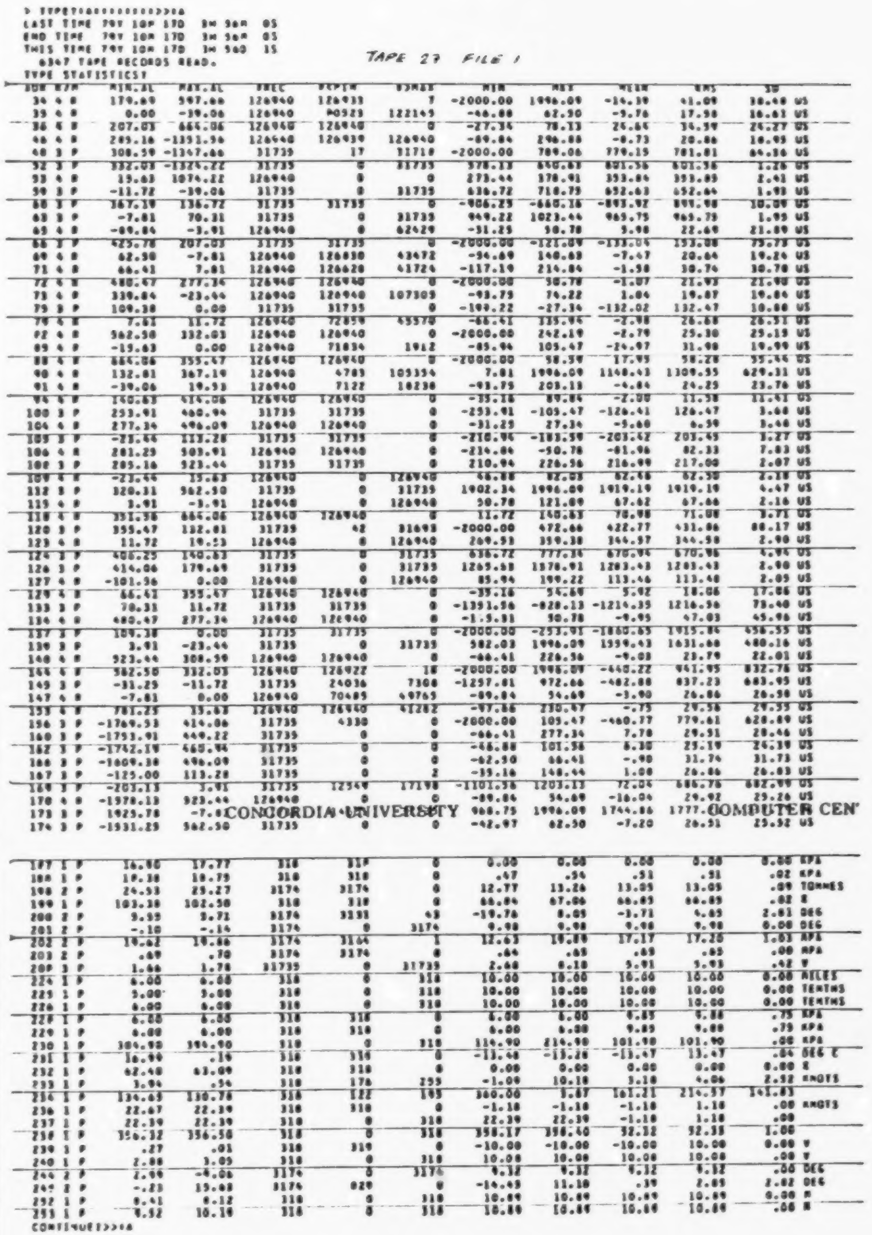
ICEBREAKER SUPPORT ☒
NAME CCGS Pierre Radisson
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE: Determine structural response to ice breaking
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis.

RECORDING NOTES
MODE: RECORDING ☒
STANDBY ☐
INTERVAL= SECS
TAPE INFO: HEADER ☐
EOF ☐
OMIT CHANNELS: (SEE APPENDIX A) 66,75,127,156,198,203,236,239,240

VIDEO RECORDING - TAPE Nº:
TIME: TO GMT
PHOTOS = -
# TO

COMMENTS: Due to darkness ship not following precise path of icebreaker and frequently breaks own path. Actual gauge readings, in microstrains, are equal to one-half the values on the printout. See Appendix A.



TAPE 27 FILE 1

CONCORDIA UNIVERSITY COMPUTER CEN

VOYAGE RECORDS

INDEX Nº 79-6-28.1
YR.-VOYAGE-TAPE FILE

DATE 17th October 1979
RECORDING TIME 0358:20 TO 0451:00 GMT
ELAPSED TIME 0 H 52 M 40 S

CONTRACTOR: German & Milne Inc.
FINAL REPORT Nº 2627 TP

LOCATION Admiralty Inlet
LAT: 73 ° 36 'N
LONG: 84 ° 0 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.1 M
AFT: 11.7 M
CARGO ☒
BALLAST ☐
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER		UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS		CM		*			3				
ICE COVER	1Y | 2Y+MY | TOT	TENTHS		*	8	0	8	10	0	10	New ice
SNOW COVER		CM									
FLEXURAL STRENGTH		KPa									
COMPRESSIVE STRENGTH		MPa									
FRICTION											
PRESSURE		MPa									
RIDGES											
CRYSTAL SALINITY		%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*		*	
RAMMING				
ASTERN				
TURNING				

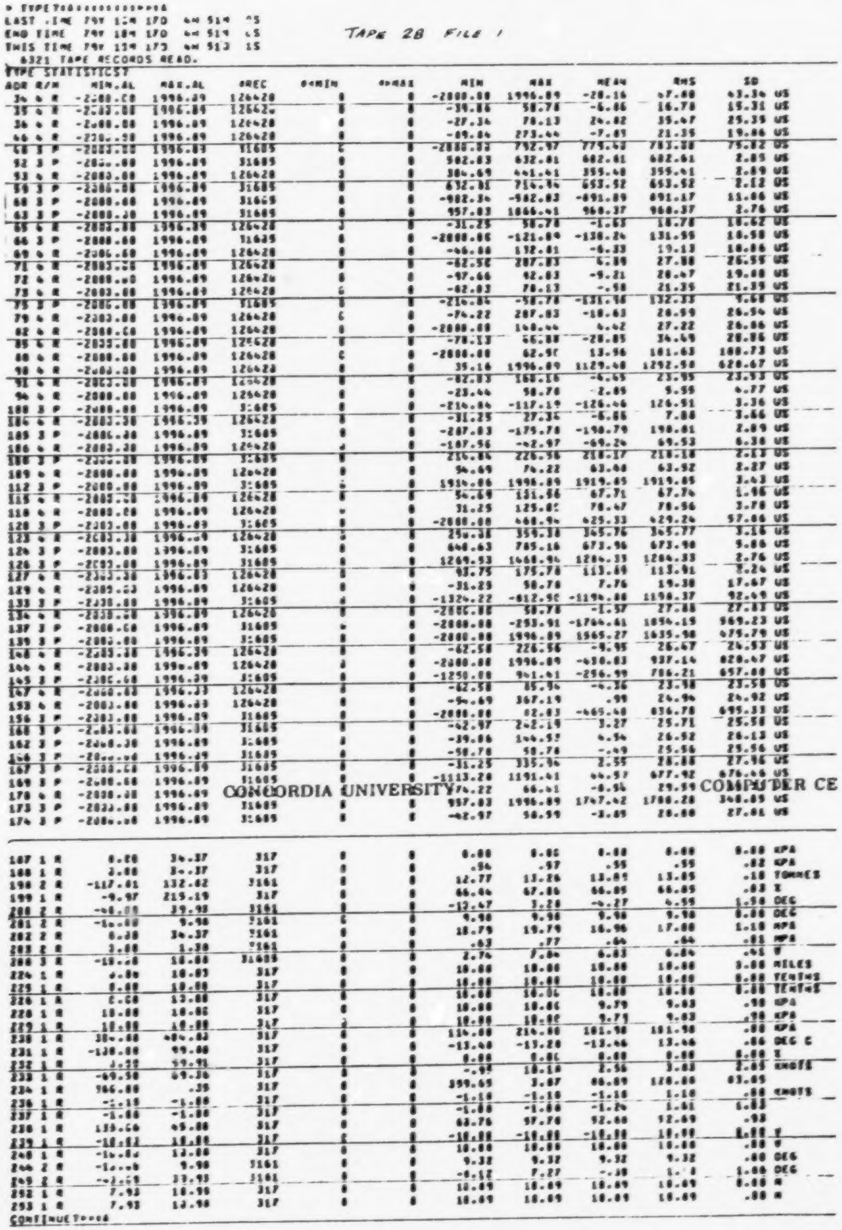
ICEBREAKER SUPPORT ☒
NAME CCGS Pierre Radisson
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE Determine structural response to ice breaking.
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis.

RECORDING NOTES
MODE RECORDING ☒
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☒
EOF ☐
OMIT CHANNELS: 66,75,127,156,198,203,236,239,240
(SEE APPENDIX A)

VIDEO RECORDING - TAPE Nº:
TIME: TO GMT
PHOTOS = -
# TO

COMMENTS Ship often breaking own path as not possible to follow precise icebreaker path in darkness. Actual gauge readings, in microstrains, are equal to one-half the values on the printout. See Appendix A.


TAPE 2B FILE 1

CONCORDIA UNIVERSITY COMPUTER CE

VOYAGE RECORDS

INDEX Nº 79-6-29.1

YR.-VOYAGE · TAPE FILE

DATE 17th October, 1979

RECORDING TIME 0451:56 **TO** 0546:08 **GMT**

ELAPSED TIME 0 H 54M 12 S

CONTRACTOR: German & Milne Inc.

FINAL REPORT Nº 2627 **TP**

LOCATION Lancaster Sound

LAT: 73 ° 42 'N

LONG: 83 ° 24 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: 10.1 M CARGO ☑ BUBBLER ON ☐

AFT: 11.7 M BALLAST ☐ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE				COMMENTS
ICE THICKNESS	CM		*		8		10	
ICE COVER [1Y] [2Y+MY] [TOT]	TENTHS		*		9			
SNOW COVER	CM							
FLEXURAL STRENGTH	KPa							
COMPRESSIVE STRENGTH	MPA							
FRICTION								
PRESSURE	MPa							
RIDGES								
CRYSTAL								
SALINITY	%							

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒

NAME CCGS Pierre Radisson

FOLLOWING ☐

IN ATTENDANCE ☑

RATIONALE

REASON FOR TAPE Determine structural response to ice breaking

REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis

RECORDING NOTES

MODE RECORDING ☑

STANDBY ☐ INTERVAL= SECS

TAPE INFO HEADER ☑ EOF ☑

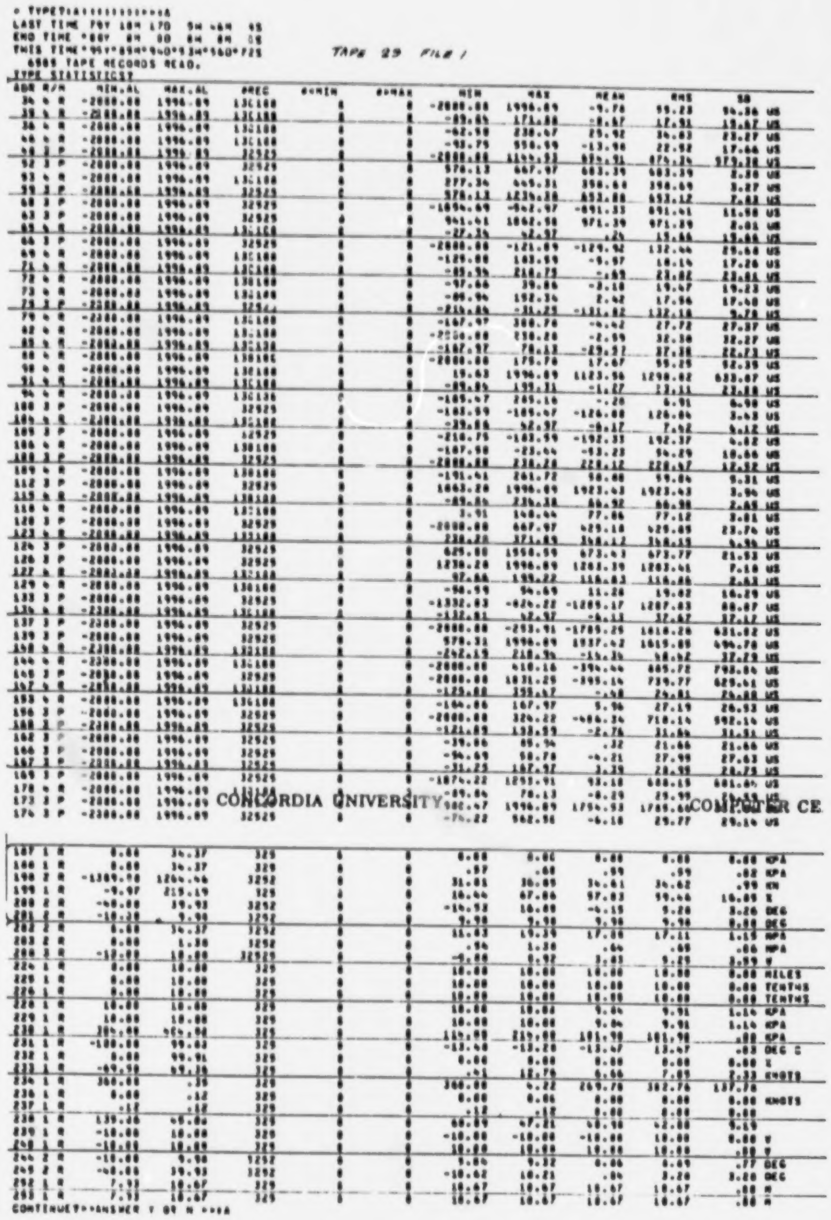
OMIT CHANNELS: 66,75,127,156,198,203,236,239,240
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:

TIME: TO GMT

PHOTOS =
TO

COMMENTS As MV Arctic unable to keep up with icebreaker or find track ship breaking own path. Actual gauge readings, in microstrains, are equal to one half the values on the printout. See Appendix A



TAPE 29 FILE 1

CONCORDIA UNIVERSITY COMPUTER CE

VOYAGE RECORDS

INDEX Nº 79-6-30.1
YR. – VOYAGE – TAPE FILE

DATE 17th October, 1979
RECORDING TIME 0642:49 TO 0735:00 GMT
ELAPSED TIME 00 H 52 M 11 S

CONTRACTOR : German & Milne Inc.
FINAL REPORT Nº 2627 TP

LOCATION Lancaster Sound
LAT : 73 ° 54 'N
LONG : 82 ° 36 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.1 M
AFT: 11.7 M
CARGO ☒
BALLAST ☐
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	15 – 30	Mostly young ice
ICE COVER 1Y | 2Y+MY | TOT	TENTHS		*	2 y 2 10 y 10	Some multi year
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

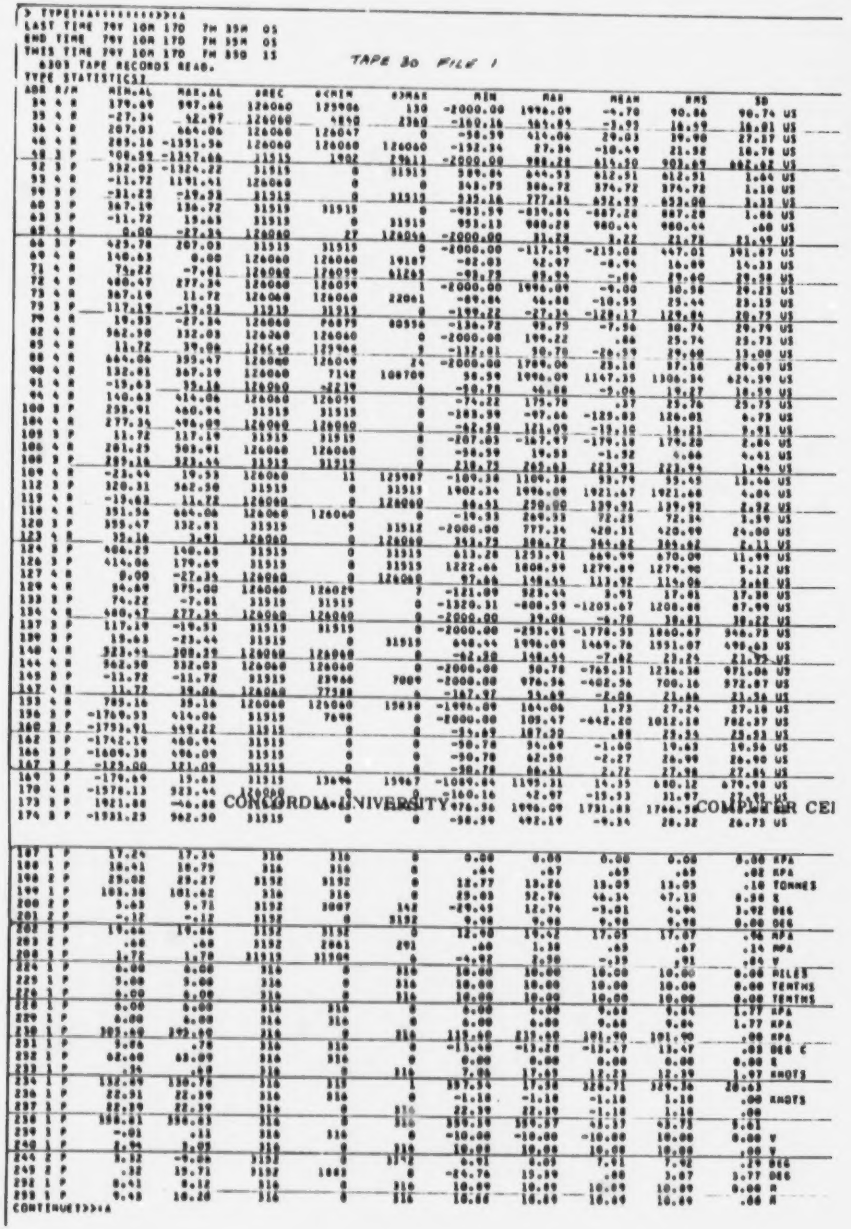
ICEBREAKER SUPPORT ☒
NAME CCGS Pierre Radisson
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE Determine structural response to ice breaking
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis

RECORDING NOTES
MODE RECORDING ☒
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS: 66,75,127,156,198,203,236,239,240
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS Actual gauge readings, in microstrains, are equal to one half the values on the printout. See Appendix A



```
> TYPE[:A:::::::::::>>:A
LAST TIME 79Y 10M 17D 7H 35M 0S
END TIME 79Y 10M 17D 7H 35M 0S
THIS TIME 79Y 10M 17D 7H 55S 1S
  6303 TAPE RECORDS READ.
TYPE STATISTICS]
ADR R/M  MIN.AL  MAX.AL  #REC  #<MIN  #>MAX  MIN  MAX  MEAN  RMS  SD
```

TAPE 30 FILE 1

CONCORDIA UNIVERSITY COMPUTER CE

VOYAGE RECORDS

INDEX Nº 79-7-31.1
YR.-VOYAGE-TAPE FILE

DATE 11th November, 1979
RECORDING TIME 1425:37 TO 1512:59 GMT
ELAPSED TIME 00 H 47 M 22 s

CONTRACTOR : German & Milne Inc.
FINAL REPORT Nº 2627 TP

LOCATION Hudson Strait
LAT : 62 ° 24 'N
LONG : 78 ° 54 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 6.1 M
AFT: 8.5 M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				open water
ICE COVER 1Y 2Y+MY TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				*
RAMMING				
ASTERN				
TURNING				

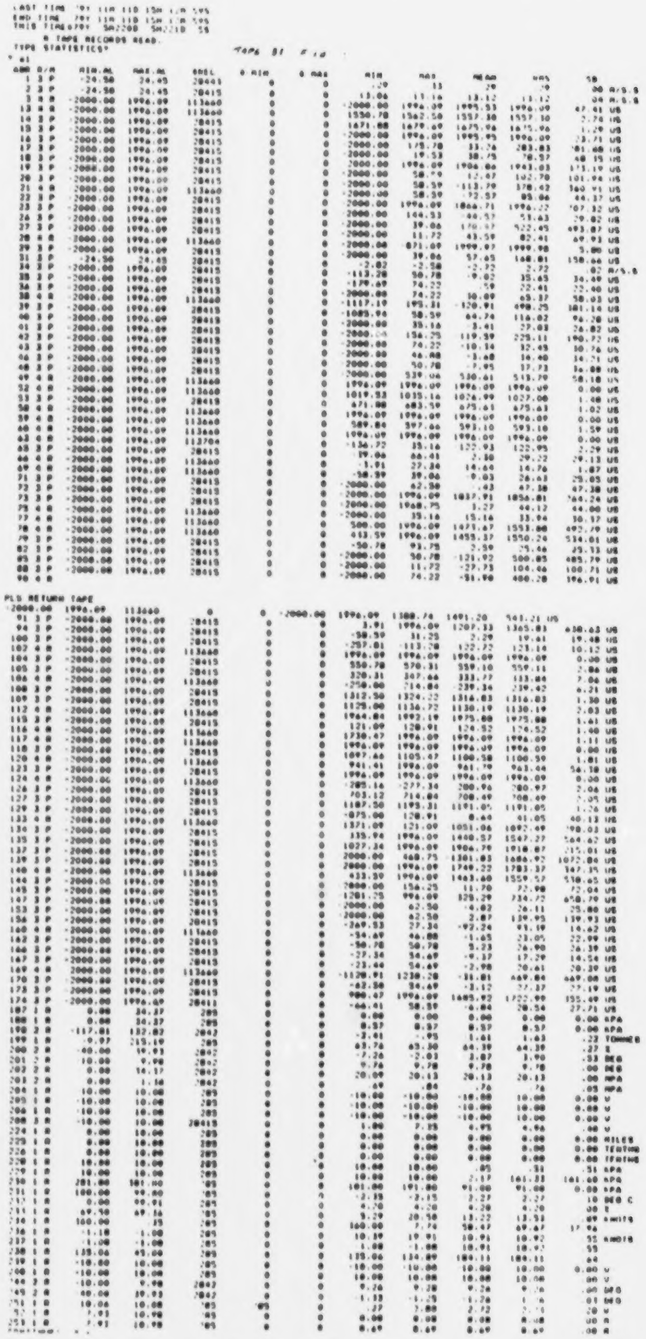
ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE Determine structural response to open water particularly at waterline.
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☒
INTERVAL= 15 SECS
TAPE INFO HEADER ☒
EOF ☐
OMIT CHANNELS: 49,58,60,66,75,102,117,123,127,156,203,204,205,206,239,240,251
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS = 1
# 3-10 TO

COMMENTS Due to frequent alarms records continuously. Actual gauge readings, in microstrains, are equal to one half the values on the printouts.
See Appendix A



VOYAGE RECORDS

INDEX Nº
79-7-32.1
YR. - VOYAGE - TAPE FILE

DATE 11th November, 1979
RECORDING TIME 2209:22 TO 2258:25 GMT
ELAPSED TIME 00 H 49 M 03 S

CONTRACTOR : German & Milne Inc.
FINAL REPORT Nº 2627 TP

LOCATION Hudson Strait
LAT : 62 ° 30 'N
LONG : 79 ° 54 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 6.1 M
AFT: 8.4 M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				open water
ICE COVER 1Y 2Y+MY TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				*
RAMMING				
ASTERN				
TURNING				

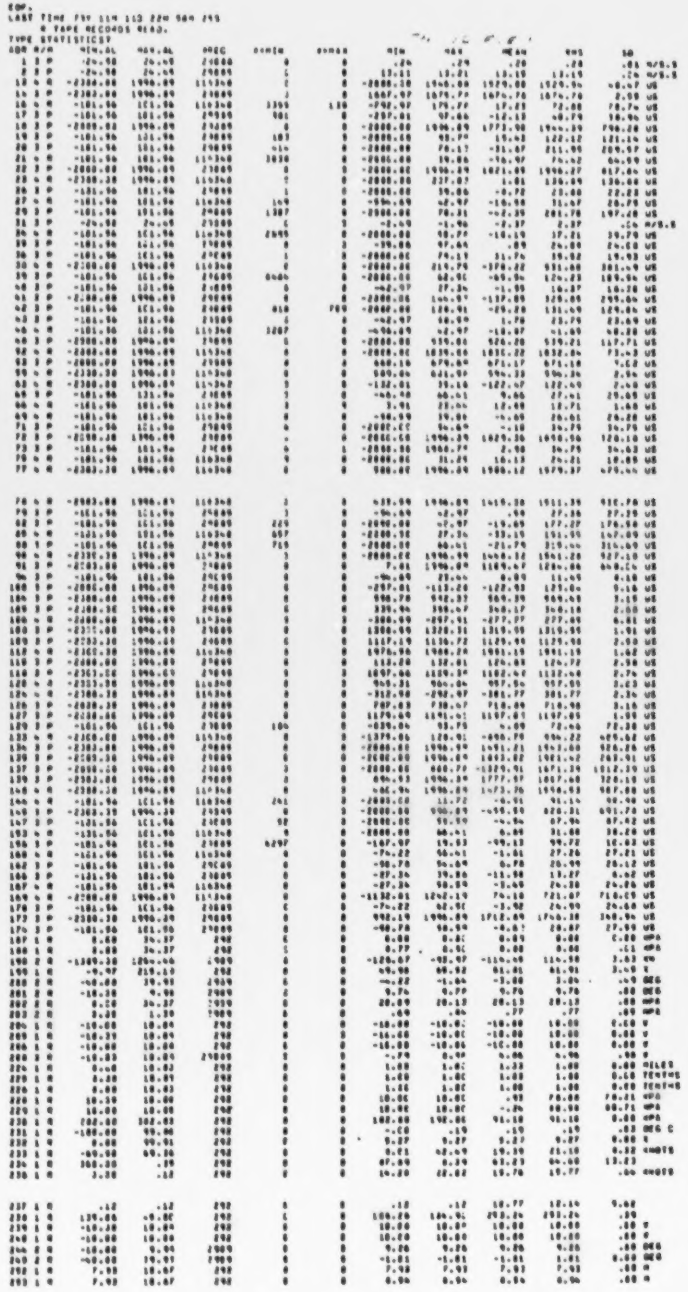
ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE Determine structural response to open water particularly at water line
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis. Alarms set to record impacts >50 με

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☒
INTERVAL= 15 SECS
TAPE INFO HEADER ☒
EOF ☒
OMIT CHANNELS: 66,75,127,156,203,204,205,206,239,240
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS Actual gauge readings, in microstrains are equal to one half the values on the printouts. See Appendix A



VOYAGE RECORDS

INDEX Nº 79-7-33.1
YR. - VOYAGE - TAPE FILE

DATE 13th November, 1979 RECORDING TIME 0545:37 TO 0608:00 GMT
ELAPSED TIME 00 H 22 M 23 S

CONTRACTOR : German & Milne Inc.
FINAL REPORT Nº 2627 TP

LOCATION Hudson's Bay
LAT : 59 ° 18 'N
LONG : 92 ° 18 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 6.1 M
AFT: 8.5 M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	8 — 10	
ICE COVER 1Y | 2Y+MY | TOT	TENTHS		*	9 0 | 9 10 | 0 10	Pancake ice
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE Determine structural response to ice breaking particularly at water line.

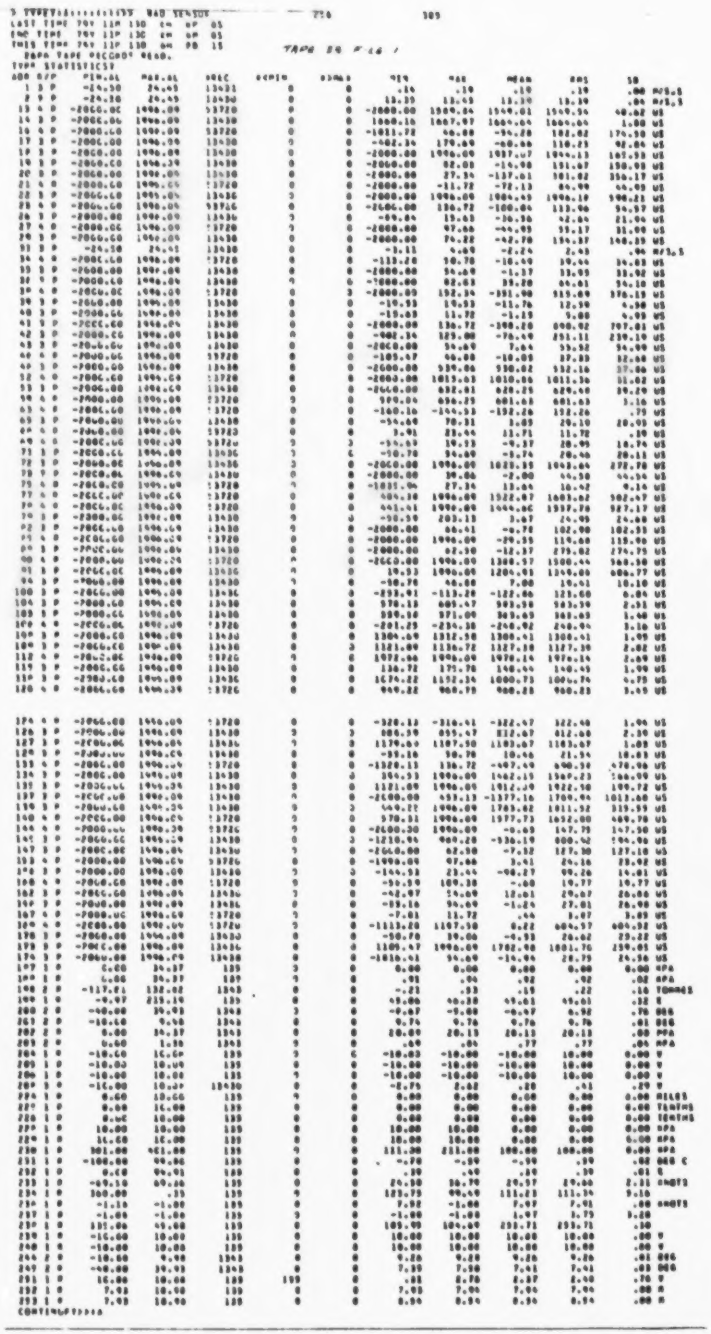
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis.

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☒
INTERVAL = 15 SECS
TAPE INFO HEADER ☒
EOF ☐
OMIT CHANNELS: 66,75,127,156,203,204,205,206,239,240,251
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS Actual gauge readings in microstrains, are equal to one half the values on the printouts. See Appendix A.



VOYAGE RECORDS

INDEX Nº 79-7-34.1
YR. - VOYAGE - TAPE FILE

DATE 13th November 1979

RECORDING TIME 0623:17 TO 0712:05 GMT
ELAPSED TIME 00 H 48 M 48 S

CONTRACTOR : German & Milne Inc.

FINAL REPORT Nº 2627 TP

LOCATION Hudson's Bay

LAT : 59 ° 12 'N
LONG : 92 ° 48 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 6.1 M
AFT: 8.5 M

CARGO ☐
BALLAST ☑

BUBBLER ON ☐
OFF ☑

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	8 10	
ICE COVER IY 2Y+MY TOT	TENTHS		*	10 0 10	
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE: Determine structural response to ice breaking particularly at water line.

REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis.

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☑
INTERVAL= 15 SECS

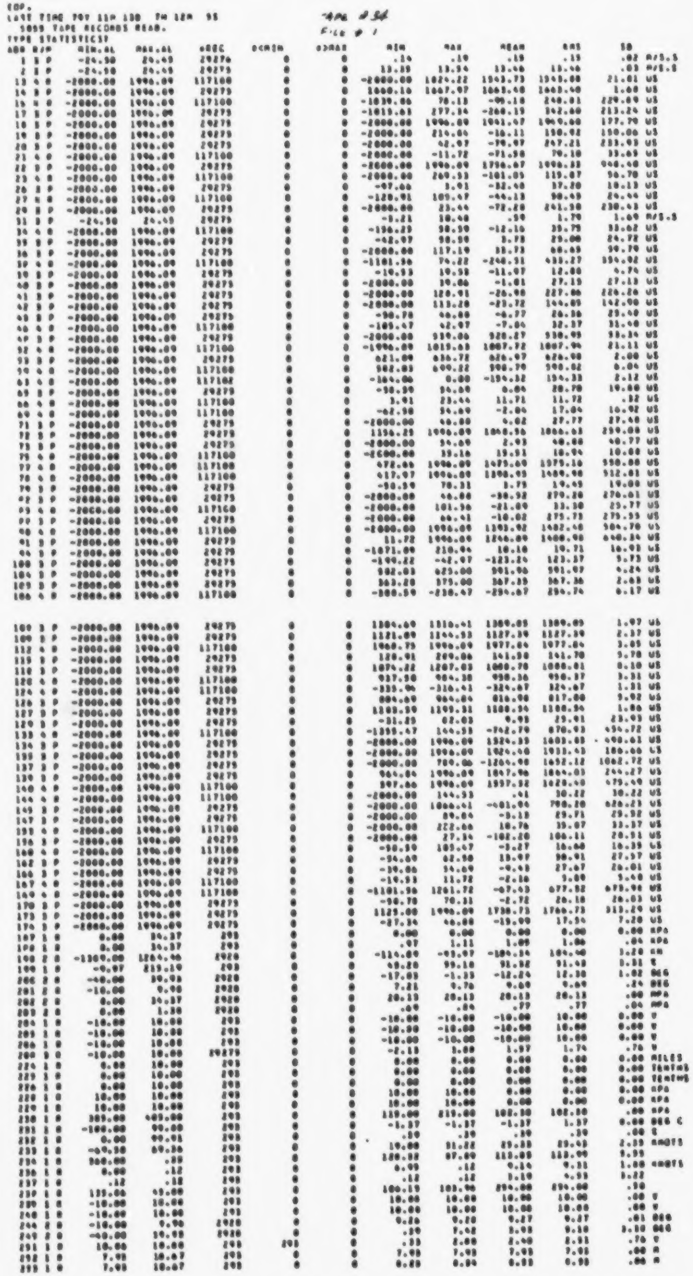
TAPE INFO HEADER ☑
EOF ☑

OMIT CHANNELS: 66,75,127,156,203,204,205,206,239,240,251
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT

PHOTOS =
TO

COMMENTS Actual gauge readings, in microstrains, are equal to one half the values on the printout. See Appendix A.



VOYAGE RECORDS

INDEX Nº 79-7-35.1
YR. - VOYAGE - TAPE FILE

DATE 13th November 1979
RECORDING TIME 0823:26 TO 0846:05 GMT
ELAPSED TIME 00 H 22 M 39 S

CONTRACTOR: German & Milne Inc.
FINAL REPORT Nº 2627 TP

LOCATION Hudson's Bay
LAT: 59 ° 6 'N
LONG: 92 ° 54 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 6.1 M CARGO ☐ BUBBLER ON ☐
AFT: 8.5 M BALLAST ☒ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	5	8	
ICE COVER [1Y] [2Y+MY] [TOT]	TENTHS		*	9 0 9		
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

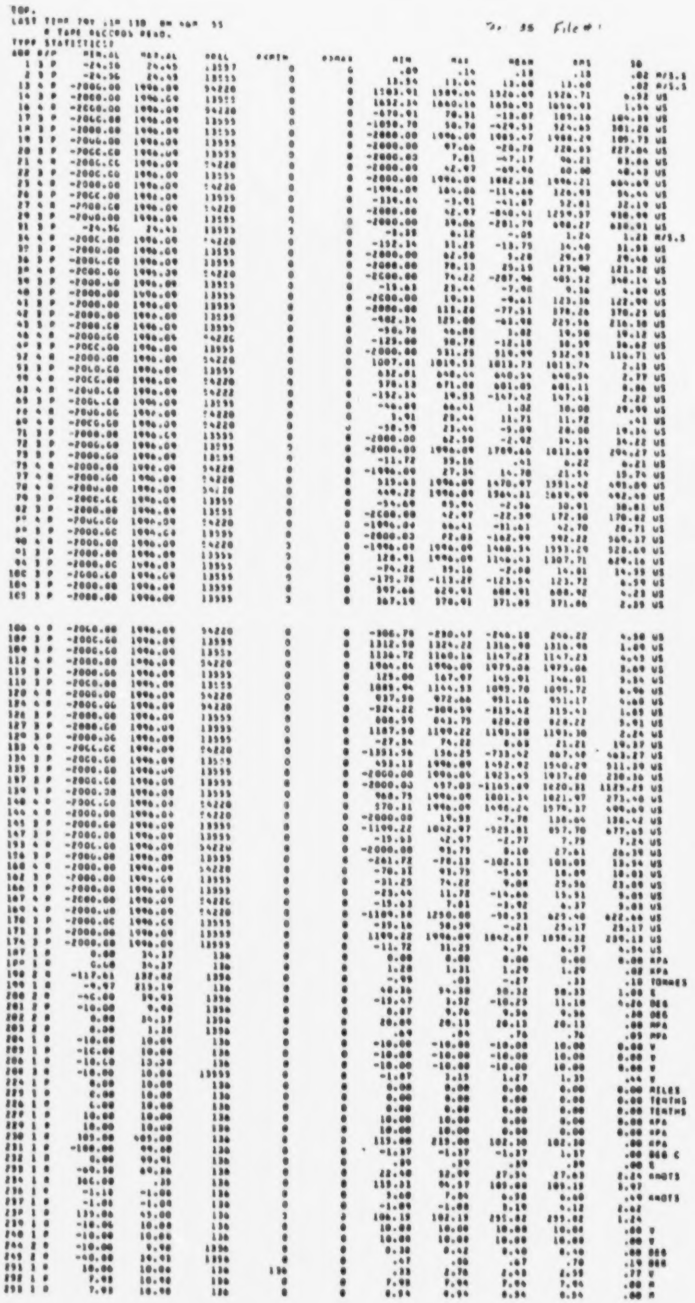
RATIONALE
REASON FOR TAPE Determine structural response to ice breaking particularly at water line.
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis.

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☒ INTERVAL= 15 SECS
TAPE INFO HEADER ☒ EOF ☒
OMIT CHANNELS:
(SEE APPENDIX A) 66,75,127,156,203,204,205,206,239,240,251

VIDEO RECORDING TAPE Nº:
TIME: TO GMT
PHOTOS =
TO

COMMENTS Actual gauge readings, in microstrains, are equal to one-half the values on the printouts. See Appendix A.



VOYAGE RECORDS

INDEX Nº 79-7-35.2
YR.-VOYAGE-TAPE FILE

DATE 13th November 1979	RECORDING TIME 0927:03 TO 0952:00 GMT	ELAPSED TIME 00 H 24 M 57 S
CONTRACTOR: German & Milne Inc.		FINAL REPORT Nº 2627 TP
LOCATION Hudson's Bay	LAT: 59 ° 6 'N	LONG: 92 ° 54 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 6.1 M
AFT: 8.5 M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM		*			5				
ICE COVER IY 2Y+MY TOT	TENTHS		*	9	0	9	10	0	10	
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

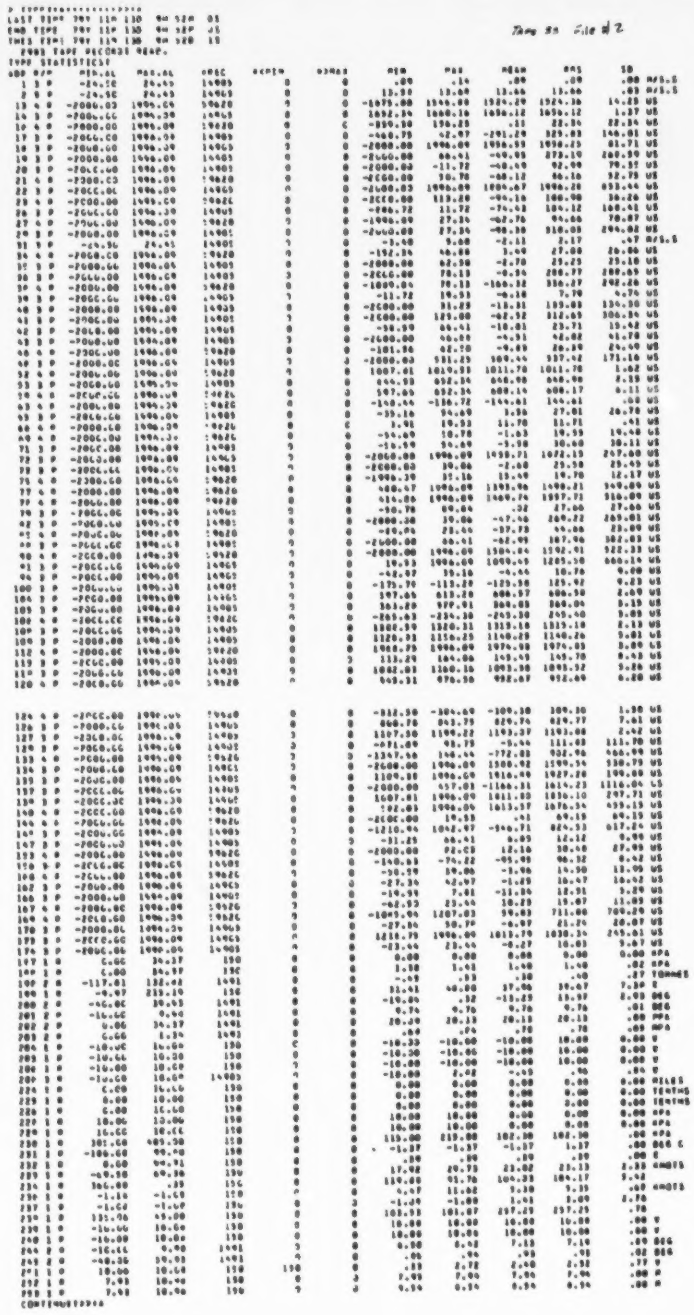
ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE: Determine structural response to ice breaking particularly at water line.
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis.

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☒
INTERVAL= 15 SECS
TAPE INFO HEADER ☒
EOF ☐
OMIT CHANNELS: (SEE APPENDIX A) 66,75,127,156,203,204,205,206,239,240,251

VIDEO RECORDING TAPE Nº:
TIME: TO GMT
PHOTOS =
TO

COMMENTS Actual gauge readings, in microstrains, are equal to one-half the values on the printouts. See Appendix A.


Tape 35 File #2

VOYAGE RECORDS

INDEX Nº 79-7-36.1
YR.-VOYAGE-TAPE FILE

DATE 13th November 1979

RECORDING TIME 1217:00 TO 1306:00 GMT

ELAPSED TIME 00 H 49 M 00 S

CONTRACTOR : German & Milne Inc.

FINAL REPORT Nº 2627 TP

LOCATION Hudson's Bay

LAT : 59 ° 0 'N

LONG : 93 ° 42 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: 6.1 M

AFT: 8.5 M

CARGO ☐

BALLAST ☒

BUBBLER ON ☐

OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER		UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS		CM		*			2			3	Pancake Ice
ICE COVER	1Y / 2Y+MY / TOT	TENTHS		*	10	0	10				
SNOW COVER		CM									
FLEXURAL STRENGTH		KPa									
COMPRESSIVE STRENGTH		MPa									
FRICTION											
PRESSURE		MPa									
RIDGES											
CRYSTAL											
SALINITY		%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐

NAME

FOLLOWING ☐

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE Determine structural response to ice breaking particularly at water line.

REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis.

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☒

INTERVAL= 15 SECS

TAPE INFO HEADER ☐

EOF ☐

OMIT CHANNELS: (SEE APPENDIX A) 66,75,127,156,203,204,205,206,239,240,251

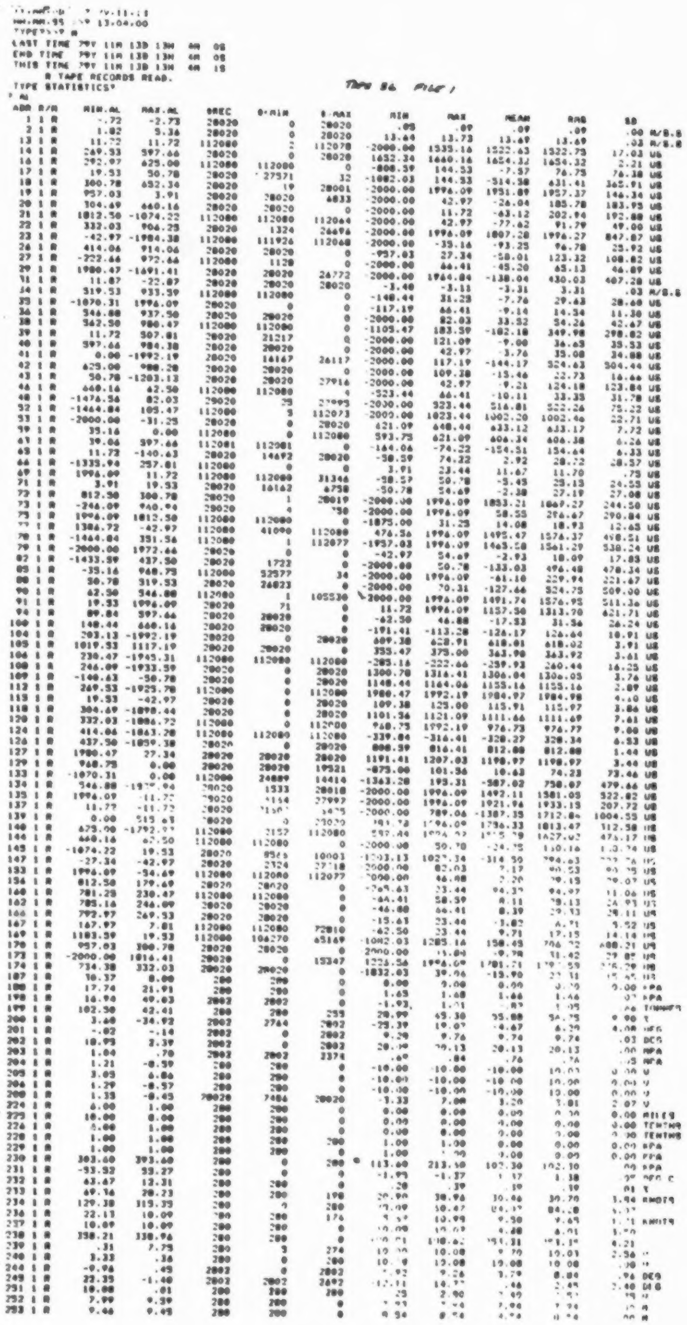
VIDEO RECORDING TAPE Nº:

TIME : TO GMT

PHOTOS =

# TO

COMMENTS Actual gauge readings, in microstrains, are equal to one-half the values on the printouts. See Appendix A.


TYPE STATISTICS
Tape 86 File 1
ADR R/R MIN.AL MAX.AL #REC @-MIN @-MAX MIN MAX MEAN RMS SD

VOYAGE RECORDS	INDEX Nº 79-7-37.1 YR.-VOYAGE-TAPE FILE

DATE 13th November 1979 RECORDING TIME 1312:09 TO 1324:23 GMT
ELAPSED TIME 00 H 12 M 14 S

CONTRACTOR : German & Milne Inc. FINAL REPORT Nº 2627 TP

LOCATION Hudson's Bay LAT : 58 ° 54 'N LONG : 93 ° 48 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 6.1 M AFT: 8.5 M
CARGO ☐ BALLAST ☒
BUBBLER ON ☐ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM		*			3				
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS		*	10	0	10				
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPA									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	*
RAMMING				
ASTERN				
TURNING				

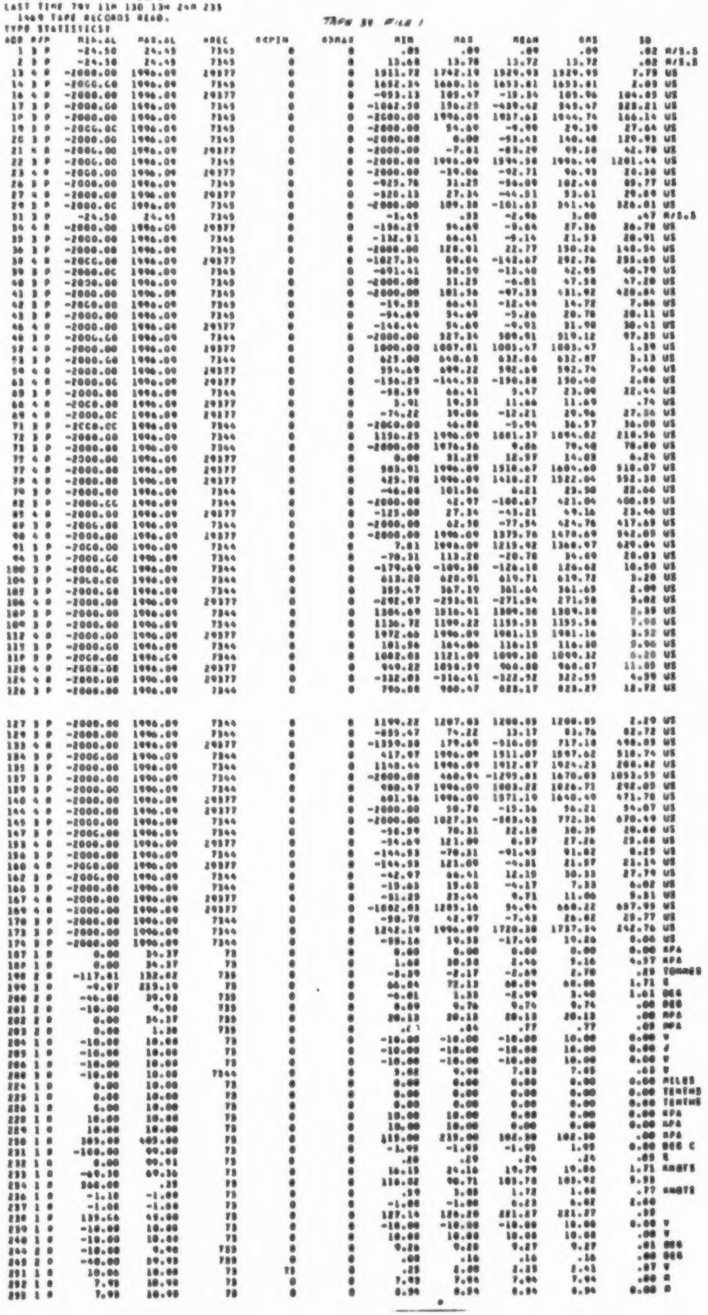
ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE Determine structural response to ice breaking particularly at water line.
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☒ INTERVAL= 15 SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS: (SEE APPENDIX A) 66,75,127,156,203,204,205,206,239,240,251

VIDEO RECORDING - TAPE Nº:
TIME : TO GMT
PHOTOS = -
# TO

COMMENTS
Actual gauge readings, on microstrains, are equal to one-half the values on the printout. See Appendix A.



VOYAGE RECORDS

INDEX Nº 79-7-37.2
YR.–VOYAGE–TAPE FILE

DATE	13th November 1979
RECORDING TIME	1358:07 TO 1424:30 GMT
ELAPSED TIME	00 H 26 M 23 S
CONTRACTOR :	German & Milne Inc.
FINAL REPORT Nº	2627 TP
LOCATION	Hudson's Bay
LAT :	58 ° 54 'N
LONG :	93 ° 48 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 6.1 M
AFT: 8.5 M
CARGO ☐
BALLAST ☒
BUBBLER ON ☒
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	23 – 30	
ICE COVER 1Y / 2Y+MY / TOT	TENTHS		*	10 0 10	
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

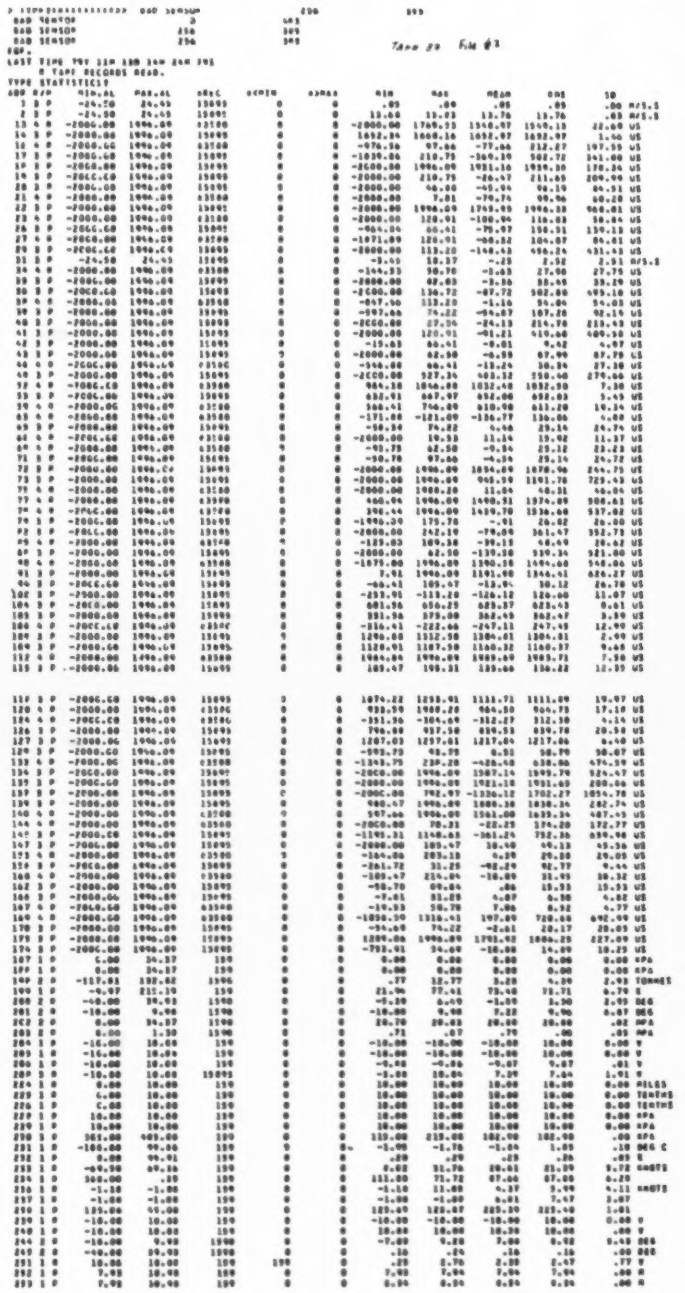
ICEBREAKER SUPPORT ☒
NAME CCGS Pierre Radisson
FOLLOWING ☐
IN ATTENDANCE ☒

RATIONALE
REASON FOR TAPE: Determine structural response to ice breaking particularly at water line.
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis.

RECORDING NOTES
MODE: RECORDING ☐ STANDBY ☒
INTERVAL= 15 SECS
TAPE INFO: HEADER ☒ EOF ☐
OMIT CHANNELS: (SEE APPENDIX A) 66,75,127,156,203,204,205,206,239,240,251

VIDEO RECORDING – TAPE Nº:
TIME : TO GMT
PHOTOS = –
# TO

COMMENTS: Actual gauge readings, in microstrains, are equal to one-half the values on the printout. See Appendix A.



VOYAGE RECORDS

INDEX Nº 79-7-38.1
YR.-VOYAGE-TAPE FILE

DATE 13th November 1979
RECORDING TIME 1526:17 TO 1610:00 GMT
ELAPSED TIME 00 H 43 M 43 S

CONTRACTOR : German & Milne Inc.
FINAL REPORT Nº 2627 TP

LOCATION Hudson's Bay
LAT : ° 'N
LONG : ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 6.1 M CARGO ☐ BUBBLER ON ☒
AFT: 8.5 M BALLAST ☒ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER				UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS				CM					30				
ICE COVER	1Y	2Y+MY	TOT	TENTHS			10	0	10				
SNOW COVER				CM									
FLEXURAL STRENGTH				KPa									
COMPRESSIVE STRENGTH				MPa									
FRICTION													
PRESSURE				MPa									
RIDGES													
CRYSTAL													
SALINITY				%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

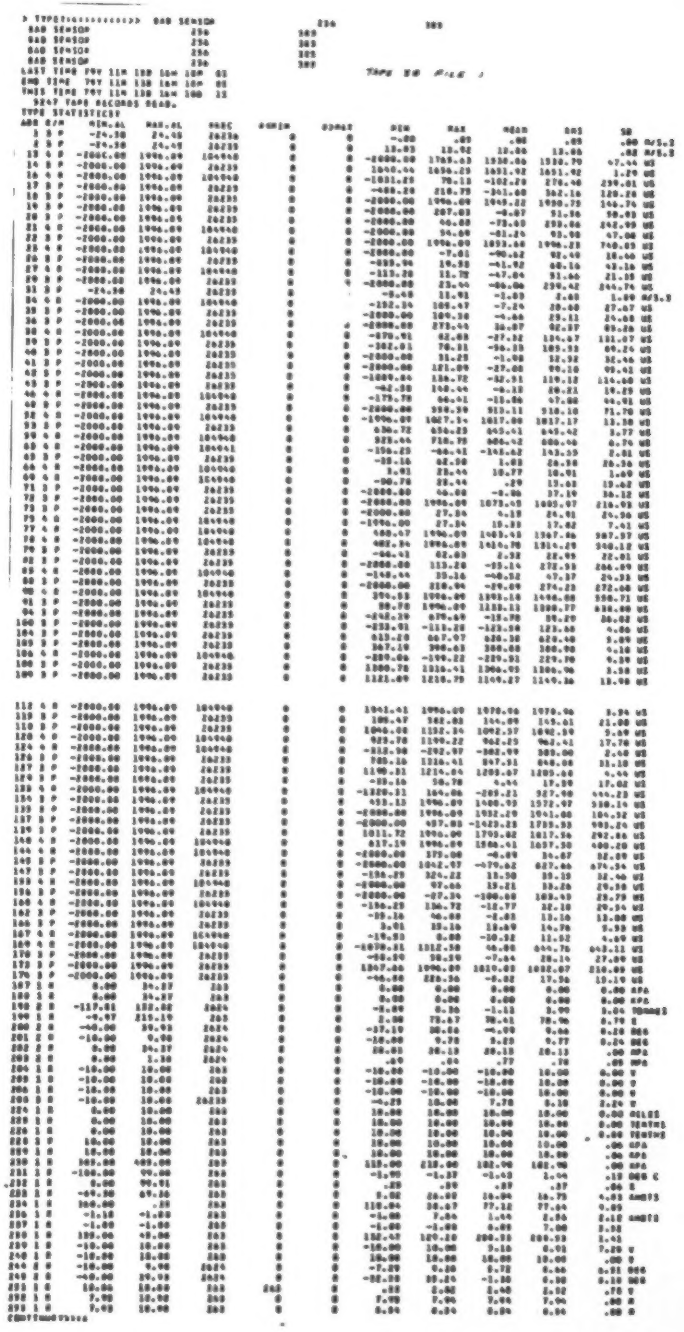
ICEBREAKER SUPPORT ☒
NAME CCGS Pierre Radisson
FOLLOWING ☐
IN ATTENDANCE ☒

RATIONALE
REASON FOR TAPE Determine structural response to ice breaking particularly at water line.
REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis.

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☒ INTERVAL= 15 SECS
TAPE INFO HEADER ☒ EOF ☐
OMIT CHANNELS: (SEE APPENDIX A) 66,75,127,156,203,204,205,206,239,240,251

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS = 3
# 3-11 TO 3-13

COMMENTS Actual gauge readings, in microstrains, are equal to one-half the value on the printout. See Appendix A.



VOYAGE RECORDS

INDEX Nº 79-7-39.1
YR.-VOYAGE-TAPE FILE

DATE 13th November 1979

RECORDING TIME 1732:04 TO 1811:52 GMT

ELAPSED TIME 00 H 39 M 48 S

CONTRACTOR : German & Milne Inc.

FINAL REPORT Nº 2627 TP

LOCATION Hudson's Bay

LAT : 58 ° 48 'N

LONG : 94 ° 0 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: 6.1 M

AFT: 8.5 M

CARGO ☐

BALLAST ☒

BUBBLER ON ☒

OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE				COMMENTS
ICE THICKNESS	CM				30			
ICE COVER 1Y / 2Y+MY / TOT	TENTHS				10		10	
SNOW COVER	CM							
FLEXURAL STRENGTH	KPa							
COMPRESSIVE STRENGTH	MPa							
FRICTION								
PRESSURE	MPa							
RIDGES								
CRYSTAL								
SALINITY	%							

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒

NAME CCGS Pierre Radisson

FOLLOWING ☐

IN ATTENDANCE ☒

RATIONALE

REASON FOR TAPE Determine structural response to ice breaking particularly at water line.

REASON FOR SAMPLING PATTERN: Collect broad range of data for possible future analysis.

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☒

INTERVAL= 30 SECS

TAPE INFO HEADER ☒

EOF ☒

OMIT CHANNELS: (SEE APPENDIX A) 66,75,127,156,203,204,205,206,239,240,251

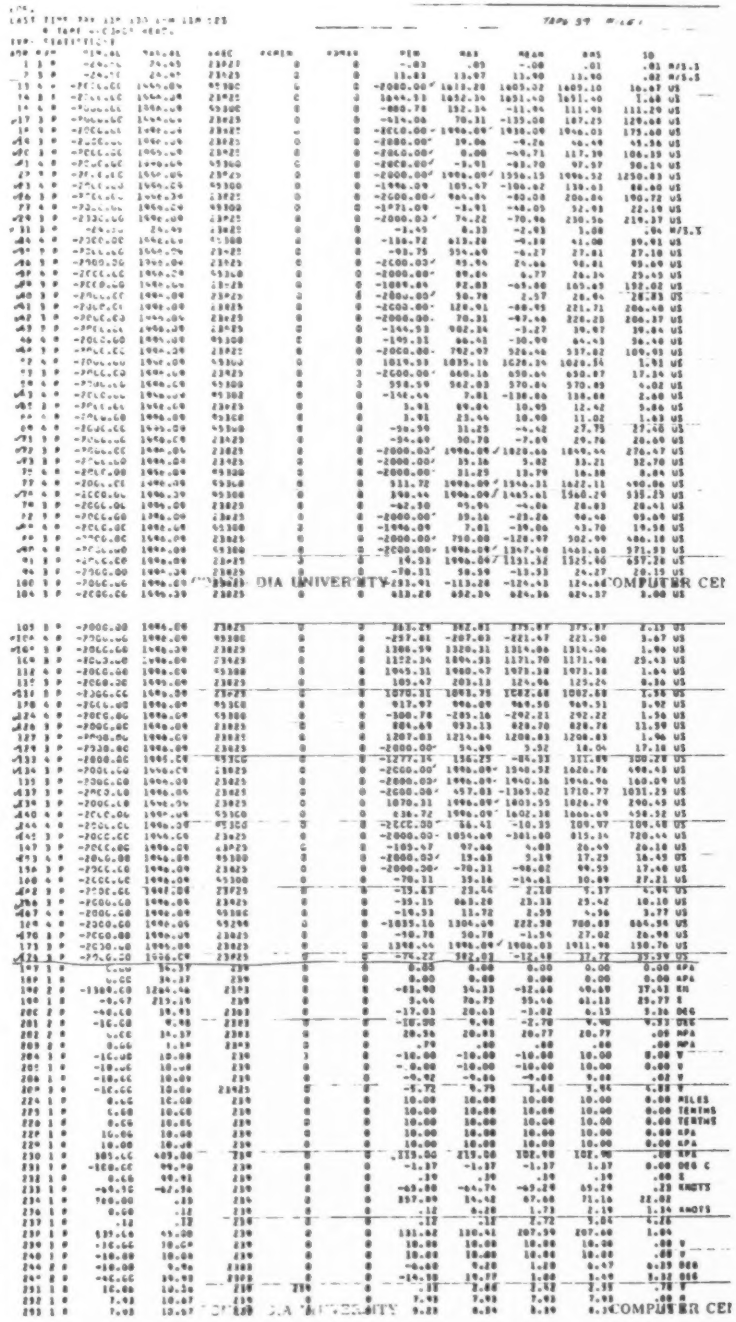
VIDEO RECORDING - TAPE Nº:

TIME : TO GMT

PHOTOS = -

TO

COMMENTS Actual gauge readings, in microstrains, are equal to one-half the values shown on the printout. See Appendix A.



2.3 ARCTIC RECORDING SEASON - 1980

2.3 ARCTIC RECORDING SEASON - 1980

During the 1980 Season the operation and maintenance of the Data Acquisition System was carried out by Fenco Consultants Ltd. in association with German & Milne Inc.

The season lasted from 10th August 1980 to 9th November 1980, during which the M.V. ARCTIC made two round trips to the Canadian Arctic and one to Churchill, Manitoba. A total of 21 tapes were recorded on these trips. Ice conditions in this season were normal.

The sampling rates in the system software for rates 4 and 6 were changed on October 22, 1980. They are shown on the following page.

SAMPLING RATES

R - Real
P - Peak

EFFECTIVE PRIOR TO OCTOBER 22, 1980

Rate 0 - Sensor not sampled
Rate 1 - 1 sample/10 seconds
Rate 2 - 1 sample/second
Rate 3 - 10 samples/second
Rate 4 - 40 samples/second
Rate 5 - 100 samples/second
Rate 6 - 250 samples/second
Rate 7 - 1000 samples/second

EFFECTIVE AS OF OCTOBER 22, 1980

Rate 0 - Sensor not sampled
Rate 1 - 1 sample/10 seconds
Rate 2 - 1 sample/second
Rate 3 - 10 samples/second
Rate 4 - 50 samples/second
Rate 5 - 100 samples/second
Rate 6 - 500 samples/second
Rate 7 - 1000 samples/second

VOYAGE LOG
Arctic Season 1980

Voyage No.	Origin - Destination (Dates)	Tape Numbers (number of files)	Video Tape No.	Dates in Ice (total time)	Recording Time (hr:min:sec)	
					in ice	total
80-1	Montreal - Little Cornwallis Island (10 Aug - 18 Aug)	1(1), 2(3), 3(3),4(1) 5(2)	V1	17 Aug 0455 - 17 Aug 1630 (11:35)	5:5:12	5:5:12
80-2	Little Cornwallis Island - Nanisivik - Antwerp (2 Sept - 5 Sept - 15 Sept)	6(1), 7(2), 8(2), 9(2)	V1, V3			8:41:0
80-3	Antwerp - Nanisivik (20 Sept - 1 Oct)	-	-			-
80-4	Nanisivik - Antwerp (3 Oct - 12 Oct)	10(1), 11(2), 12(3), 13(1) 14(1)	V2	3 Aug 0455 - 3 Aug 2245 (17:50)	12:8:0	12:8:0
80-5	Antwerp - Pond Inlet (16 Oct - 25 Oct)	15(1), 16(1), 17(3)	V2, V3	25 Aug 0815 - 25 Aug 1930 (11:15)	9:7:0	9:7:0
80-6	Pond Inlet - Churchill (1 Nov - 9 Nov)	18(1), 19(1), 20(1), 21(2)	-			(10:1:0) partial
				TOTAL (hrs:mins:secs)		45:1:12

Voyage No. 80 - 1
Montreal - Little Cornwallis Island
10 Aug. 80 - 18 Aug. 80
Tape Nos: 1 - 5

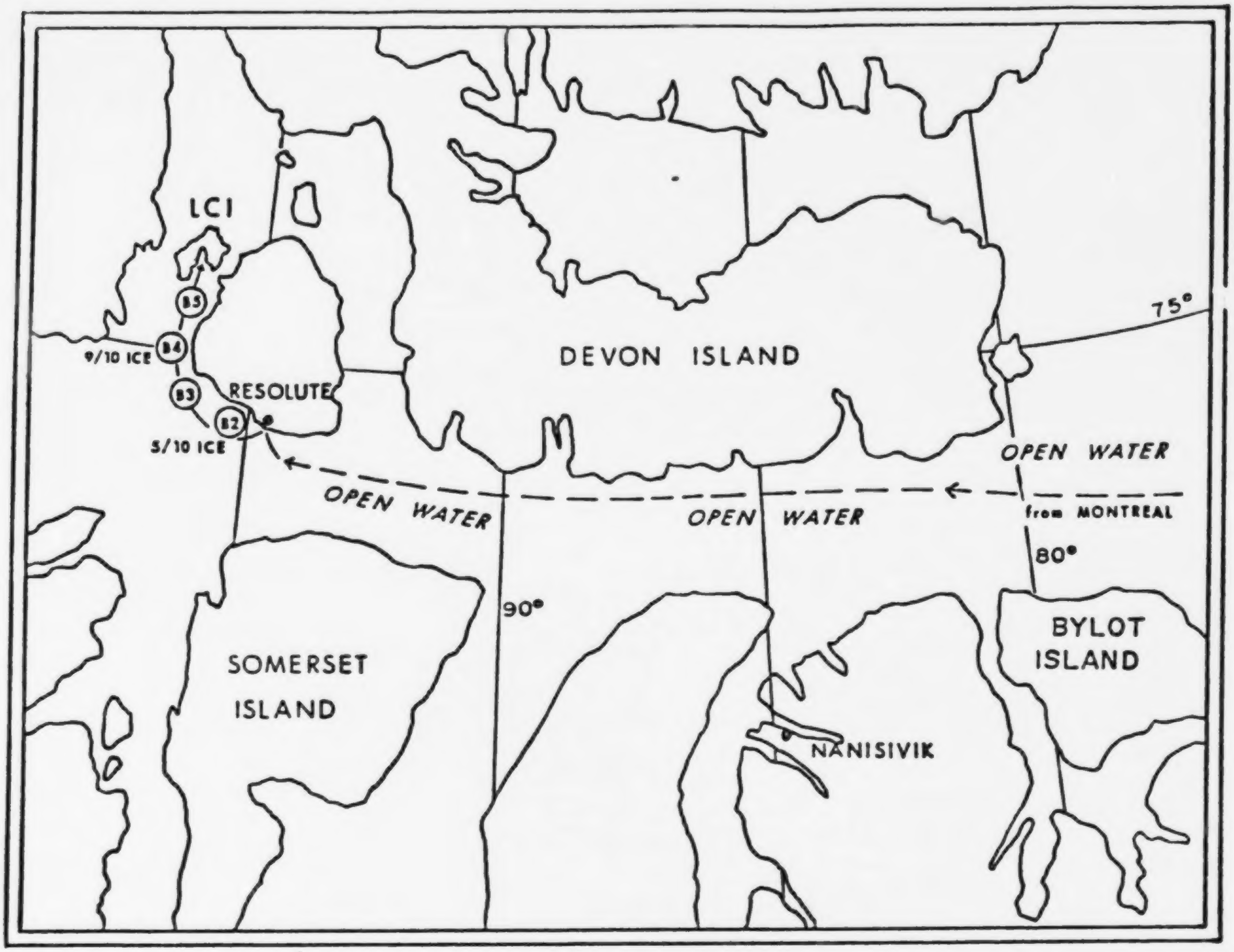

LCI
B5
9/10 ICE
B4
B3
RESOLUTE
B2
5/10 ICE
DEVON ISLAND
75°
OPEN WATER
OPEN WATER
OPEN WATER
from MONTREAL
80°
90°
SOMERSET ISLAND
BYLOT ISLAND
NANISIVIK

Figure 2.10 SHIPS ROUTE ON TRIP #1 - 1980 SHIPPING SEASON

Trip #1

The ship departed Montreal on August 10 for its first trip and followed the route shown in Figure 2.1 arriving at Little Cornwallis Island (L.C.I.) on August 17. Ice was only encountered between Resolute Bay and L.C.I. and during this time the ship was following a C.C.G. icebreaker so there were no major impacts. However, one test tape and four data tapes were recorded for comparison with analogue recordings made at the same time.

Voyage No. 80 - 2
Little Cornwallis Island - Nanisivik - Antwerp
2 Sept. 80 - 5 Sept. 80 - 15 Sept. 80
Tape Nos. 6 to 9

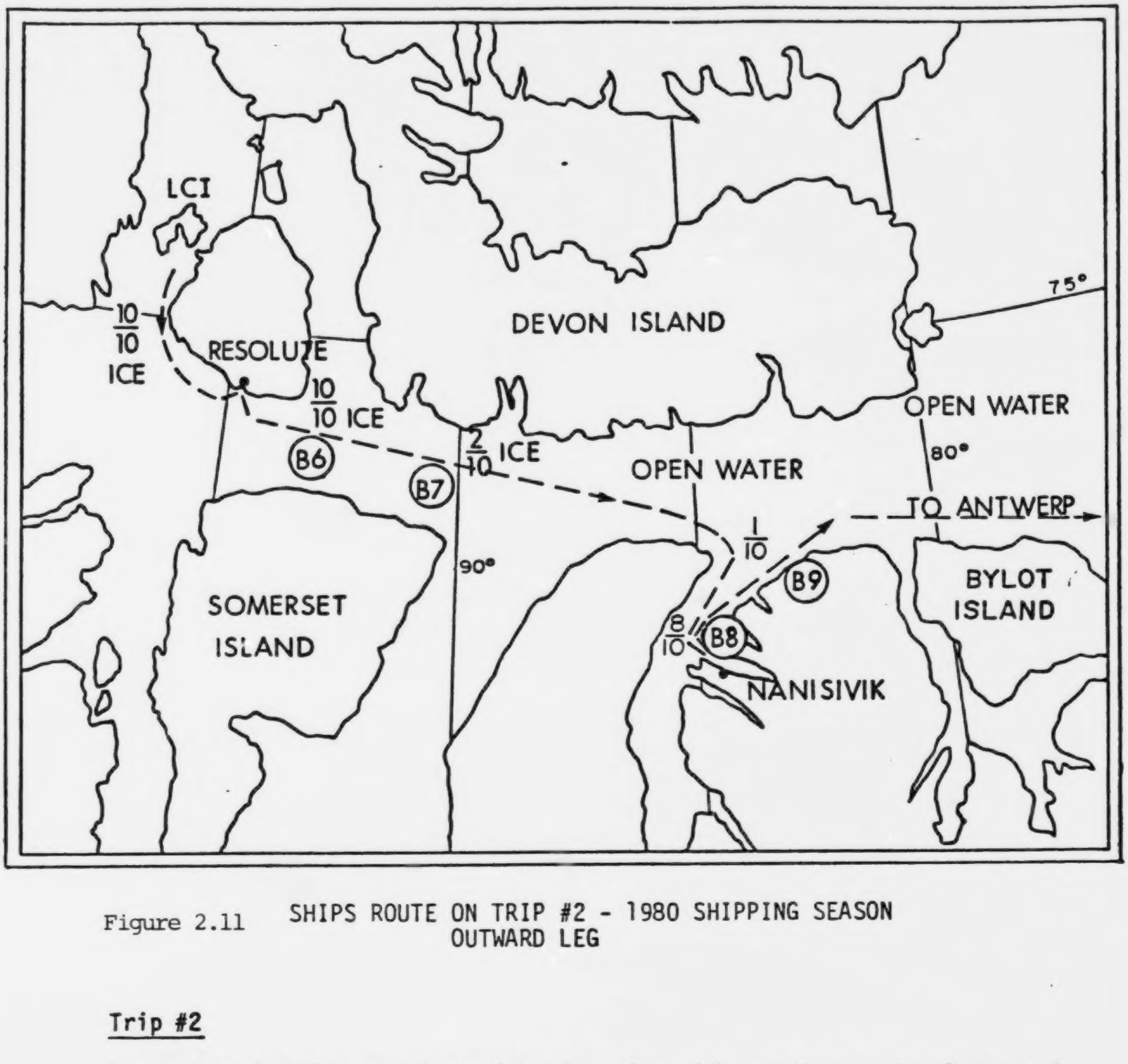

LCI
10/10 ICE
RESOLUTE
10/10 ICE
2/10 ICE
B6
B7
DEVON ISLAND
75°
OPEN WATER
OPEN WATER
80°
TO ANTWERP
1/10
B9
90°
SOMERSET ISLAND
8/10
B8
NANISIVIK
BYLOT ISLAND

Figure 2.11 SHIPS ROUTE ON TRIP #2 - 1980 SHIPPING SEASON OUTWARD LEG

Trip #2

Departing L.C.I. on September 3, the ship went to Resolute and Nanisivik and then across to Antwerp, returning to Nanisivik on September 30. Heavy ice was passed through between L.C.I. and Resolute but no recordings were made because the equipment was inoperative. More ice was encountered between Resolute and Nanisivik, as well as on leaving Nanisivik, and two tapes were recorded on each occasion (Figure 2.2). On the return journey there was 3 cm new ice in Admiralty Inlet but with the ship in ballast most strain gauges were above the waterline so no recordings were made.

Voyage No. 80 - 3
Antwerp - Nanisivik
3 Oct. 80 - 12 Oct. 80
Tape Nos. 10 to 14

Voyage No. 80 - 4
Antwerp - Pond Inlet
16 Oct. 80 - 25 Oct. 80
Tape Nos. 15 to 17

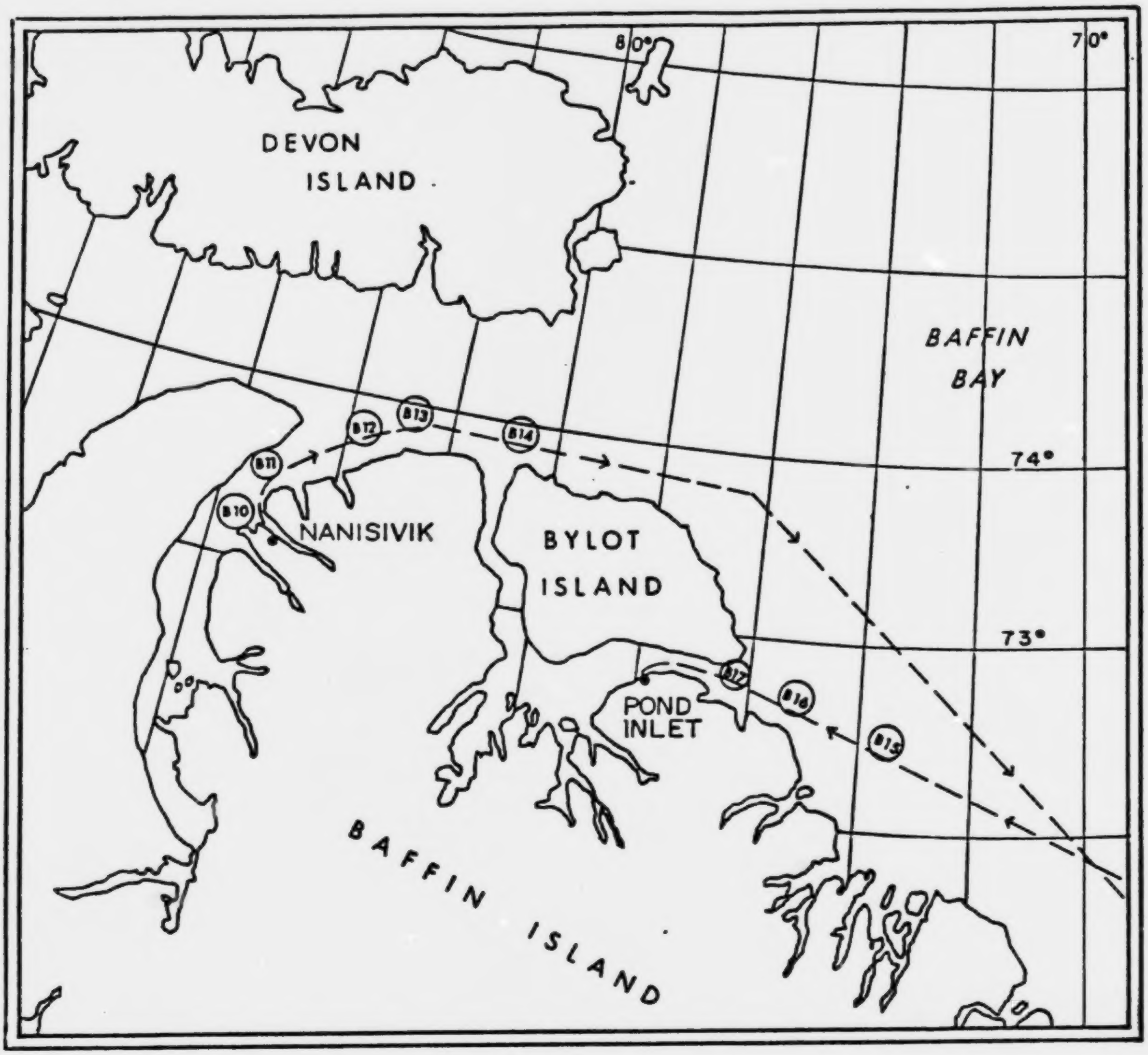

80°
70°
DEVON ISLAND
BAFFIN BAY
74°
73°
B10
B11
B12
B13
B14
NANISIVIK
BYLOT ISLAND
B17
B16
B15
POND INLET
BAFFIN ISLAND

FIGURE 2.12 SHIPS ROUTE ON TRIP #3 - 1980 SHIPPING SEASON

Trip #3

On departure from Nanisivik on October 3, the ship was now down to its loaded waterline and five tapes were recorded enroute to Antwerp (Figure 2.3). In late October three tapes were recorded approaching Pond Inlet where the ship arrived on October 25.

Voyage No. 80 - 5
Pond Inlet - Churchill
1 Nov. 80 - 9 Nov. 80
Tape Nos. 18 to 21

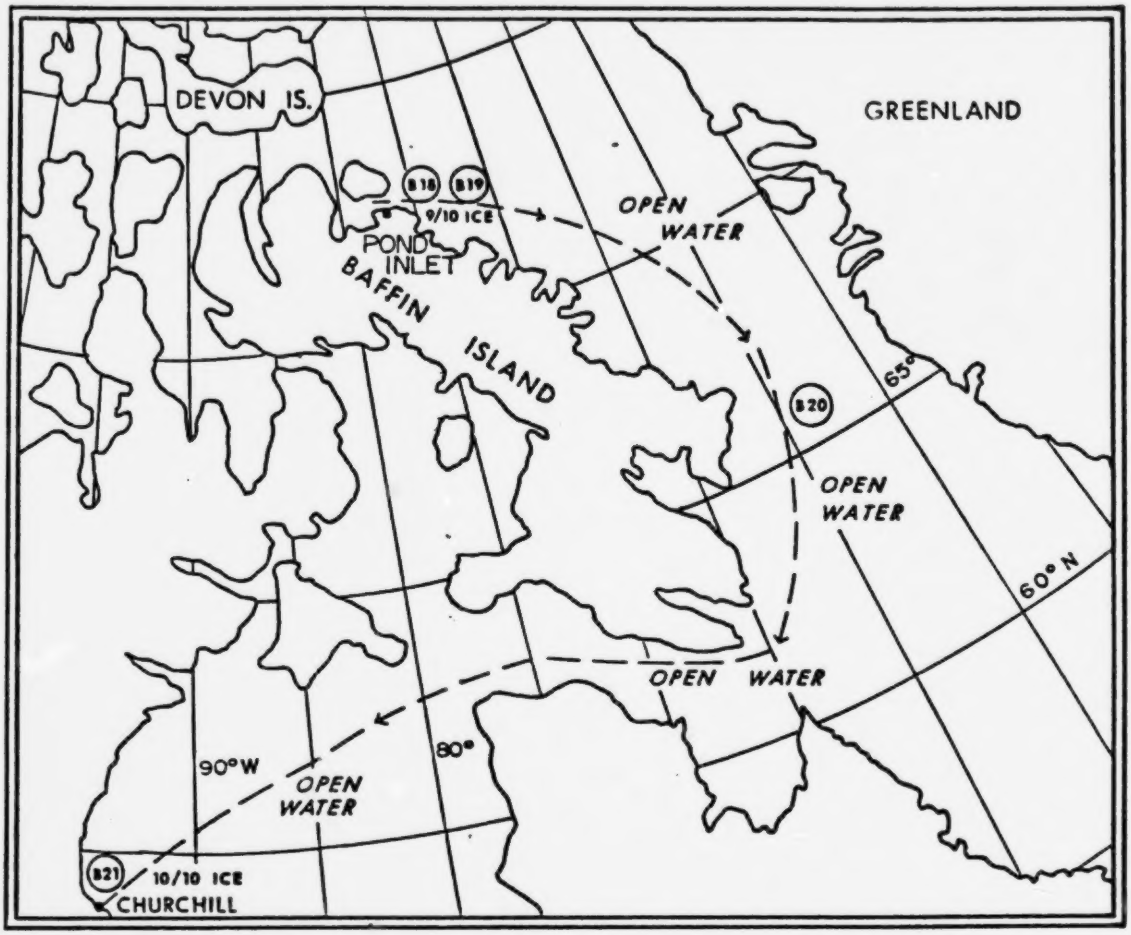

DEVON IS.
GREENLAND
B18
B19
9/10 ICE
OPEN WATER
POND INLET
BAFFIN ISLAND
B20
65°
OPEN WATER
60° N
OPEN WATER
80°
90°W
OPEN WATER
B21
10/10 ICE
CHURCHILL

FIGURE 2.13 SHIPS ROUTE ON TRIP #4 - 1980 SHIPPING SEASON

Trip #4

Leaving Pond Inlet on November 2 the ship passed through heavy multi-year ice where two tapes were recorded (Figure 2.4). Further out into Baffin Bay the ship entered open water and one tape was recorded here during conditions of force 10 winds. Open water prevailed until close to Churchill where northeasterly winds had caused an accumulation of first-year ice, and one tape was recorded on the way into Churchill and while the ship was manoeuvering at the dock.

VOYAGE RECORDS

INDEX Nº
80-1-1.1
YR.-VOYAGE-TAPE FILE

DATE 16th August 1980 RECORDING TIME 23:15 TO 23:38 GMT
ELAPSED TIME 0 H 23 M S

CONTRACTOR : Fenco Consultants Ltd.
FINAL REPORT Nº 3202 TP

LOCATION LAT : ° 'N
LONG : ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☒ BUBBLER ON ☐
AFT: M BALLAST ☐ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				
ICE COVER ☐ 1Y ☐ 2Y+MY ☐ TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:

RECORDING NOTES
MODE RECORDING ☒
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: PHOTOS =
TIME : TO GMT # TO

COMMENTS Test Tape

```
                       AL
ADR R/M    MIN AL    MAX.AL    #REC     %<MIN    %>MAX     MIN      MAX      MEAN     RMS      SD
 93 5 R  -1950.01   1946.20   140750     0.00     0.00 -1096.88  1089.26    -6.90   760.43   760.40 u
 94 5 P  -1950.01   1946.20   140750.    0.00     0.00 -1074.03  1165.43   454.29   832.36   697.46 u
122 5 R  -1950.01   1946.20   140750.    0.00     0.00 -1077.84  1077.84    -2.60   466.95   466.95 u
123 6 P  -1950.01   1946.20   351875     0.00     0.00 -1070.22  1062.60    -6.10   573.94   573.91 u
1 NEW OUTPUT
2 NEW SEARCH
3 NEW FILE
4 NEW TAPE
```

VOYAGE RECORDS

INDEX Nº 80-1-2.1
YR. - VOYAGE - TAPE FILE

DATE 17th August 1980	RECORDING TIME 04:55 TO 05:37 GMT ELAPSED TIME 0 H 42 M S	
CONTRACTOR : Fenco Consultants Ltd.	FINAL REPORT Nº 3202 TP	
LOCATION Barrow Strait	LAT : 74 ° 30 'N LONG : 93 ° 00 'W	
OPERATING CONDITIONS (SHIP) DRAUGHT FWD: 9.8 M AFT: M	CARGO ☒ BALLAST ☐	BUBBLER ON ☐ OFF ☒ ERPM = 350 to 400

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE			COMMENTS
ICE THICKNESS	CM		*		31		
ICE COVER IY | 2Y+MY | TOT	TENTHS		*	2 0	2 5	0 5	mean floe dia. = 4 m
SNOW COVER	CM						
FLEXURAL STRENGTH	KPa						
COMPRESSIVE STRENGTH	MPa						
FRICTION							
PRESSURE	MPa						
RIDGES							
CRYSTAL							
SALINITY	%						

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐

NAME

FOLLOWING ☐

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN:

RECORDING NOTES

MODE RECORDING ☒

STANDBY ☐ INTERVAL= SECS

TAPE INFO HEADER ☐ EOF ☐

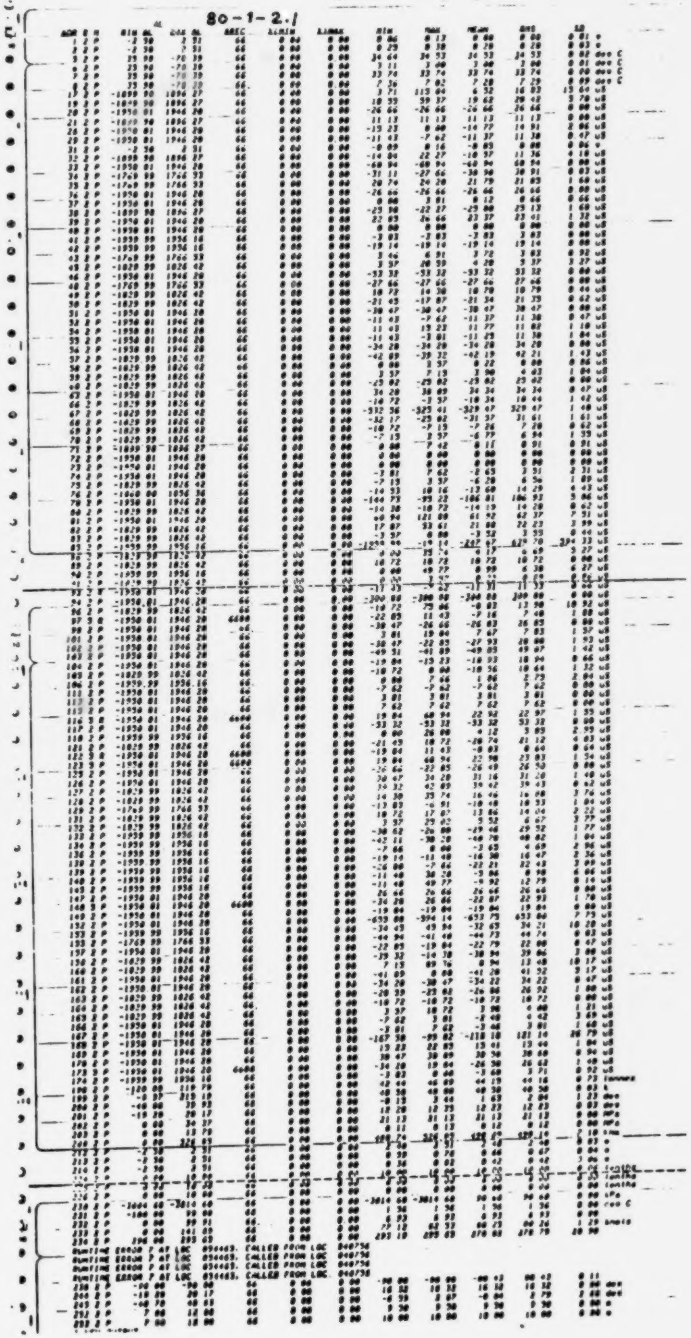
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING 80-V1 TAPE Nº:

TIME : TO 05:37 GMT

PHOTOS =
# TO

COMMENTS


80-1-2.1

VOYAGE RECORDS

INDEX Nº 80-1-2.2
YR.-VOYAGE-TAPE FILE

DATE 17th August 1980

RECORDING TIME 06:10 TO 06:35 GMT
ELAPSED TIME 0 H 25 M S

CONTRACTOR : Fenco Consultants Ltd.

FINAL REPORT Nº 3202 TP

LOCATION Barrow Strait

LAT : 74 ° 30 'N
LONG : 93 ° 00 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: 9.8 M

CARGO ☒
BALLAST ☐

BUBBLER ON ☐ OFF ☒

ERPM = 320 to 410

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	35		
ICE COVER 1Y 2Y+MY TOT	TENTHS		*	0 4	0 4	mean floe dia = 2 m
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	*
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

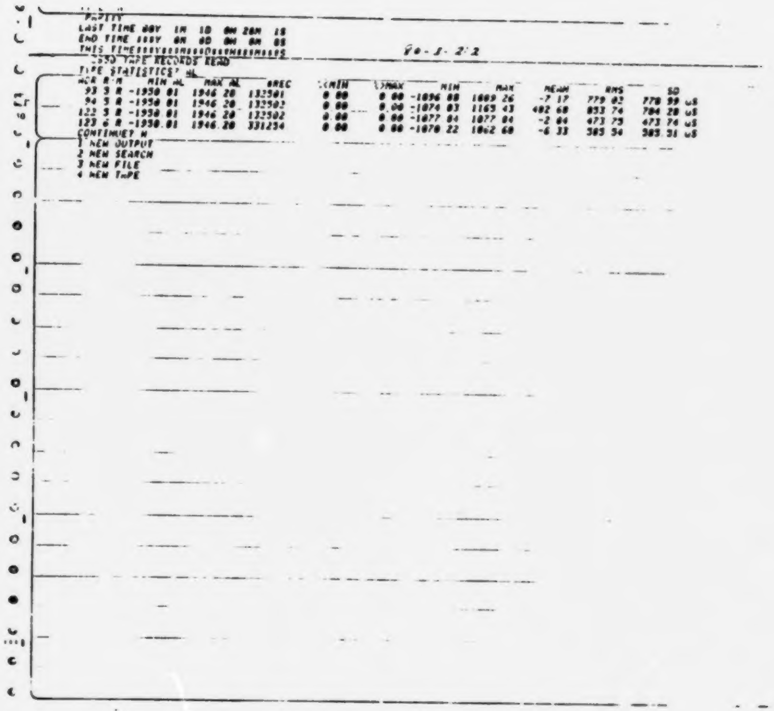
RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING 80-V1
TAPE Nº:
TIME : 06:10 TO GMT
PHOTOS =
# TO

COMMENTS



80-1-2.2

```
[illegible]
LAST TIME DDY   1H   1D   0H 20M   1S
END TIME DDDY   0H   0D   0H  0M   0S
THIS TIME[illegible]
 2550 TAPE RECORDS READ
TAPE STATISTICS? NL
NCR R M      MIN NL     MAX NL     #REC      <MIN      >MAX       MIN       MAX       MEAN      RMS       SD
  93 5 R  -1950 01   1946 20   132501      0 00      0 00  -1096 08   1089 26    -7 17   779 02    778 99 uS
  94 5 R  -1950 01   1946 20   132502      0 00      0 00  -1074 03   1165 43   482 68   853 74    704 28 uS
 122 5 R  -1950 01   1946 20   132502      0.00      0 00  -1077 04   1077 04    -2 04   473 75    473 74 uS
 123 6 R  -1950.01   1946.20   331234      0 00      0 00  -1070 22   1062 60    -6 33   385 54    385 31 uS
CONTINUE? N
1 NEW OUTPUT
2 NEW SEARCH
3 NEW FILE
4 NEW TAPE
```

VOYAGE RECORDS

INDEX Nº
80-1-2.3
YR. – VOYAGE – TAPE FILE

DATE
17th August 1980

RECORDING TIME 07:43 TO 08:00 GMT
ELAPSED TIME 0 H 17 M S

CONTRACTOR : Fenco Consultants Ltd.

FINAL REPORT Nº 3202 TP

LOCATION Barrow Strait

LAT : 74 ° 30 'N
LONG : 93 ° 00 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 9.8 M
AFT: M
CARGO ☒
BALLAST ☐
BUBBLER ON ☐
OFF ☒
ERPM = 350

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE			COMMENTS
ICE THICKNESS	CM		*	40		40	
ICE COVER 1Y 2Y+MY TOT	TENTHS		*	8	1	9	A few second yr. pieces
SNOW COVER	CM						
FLEXURAL STRENGTH	KPa						
COMPRESSIVE STRENGTH	MPa						
FRICTION							
PRESSURE	MPa						
RIDGES							
CRYSTAL							
SALINITY	%						

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING 80-V1
TAPE Nº:
TIME : 07:43 TO 08:00 GMT
PHOTOS =
TO

COMMENTS

No printout available

VOYAGE RECORDS

INDEX Nº 80-1-3.1
YR. - VOYAGE - TAPE FILE

DATE 17th August 1980

RECORDING TIME 08:16 TO 09:28 GMT
ELAPSED TIME 1 H 12 M S

CONTRACTOR : Fenco Consultants Ltd.

FINAL REPORT Nº 3202 TP

LOCATION Barrow Strait

LAT : 74 ° 45 'N
LONG : 96 ° 00 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 9.8 M
AFT: M
CARGO ☒
BALLAST ☐
BUBBLER ON ☐ OFF ☒
ERPM = 300 to 360

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE			COMMENTS
ICE THICKNESS	CM		*	25		70	
ICE COVER [1Y | 2Y+MY | TOT]	TENTHS		*	0	9 | 1	10	Some multiyear pieces
SNOW COVER	CM						
FLEXURAL STRENGTH	KPa						
COMPRESSIVE STRENGTH	MPa						
FRICTION							
PRESSURE	MPa						
RIDGES							
CRYSTAL							
SALINITY	%						

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	*
RAMMING				
ASTERN				
TURNING			*	

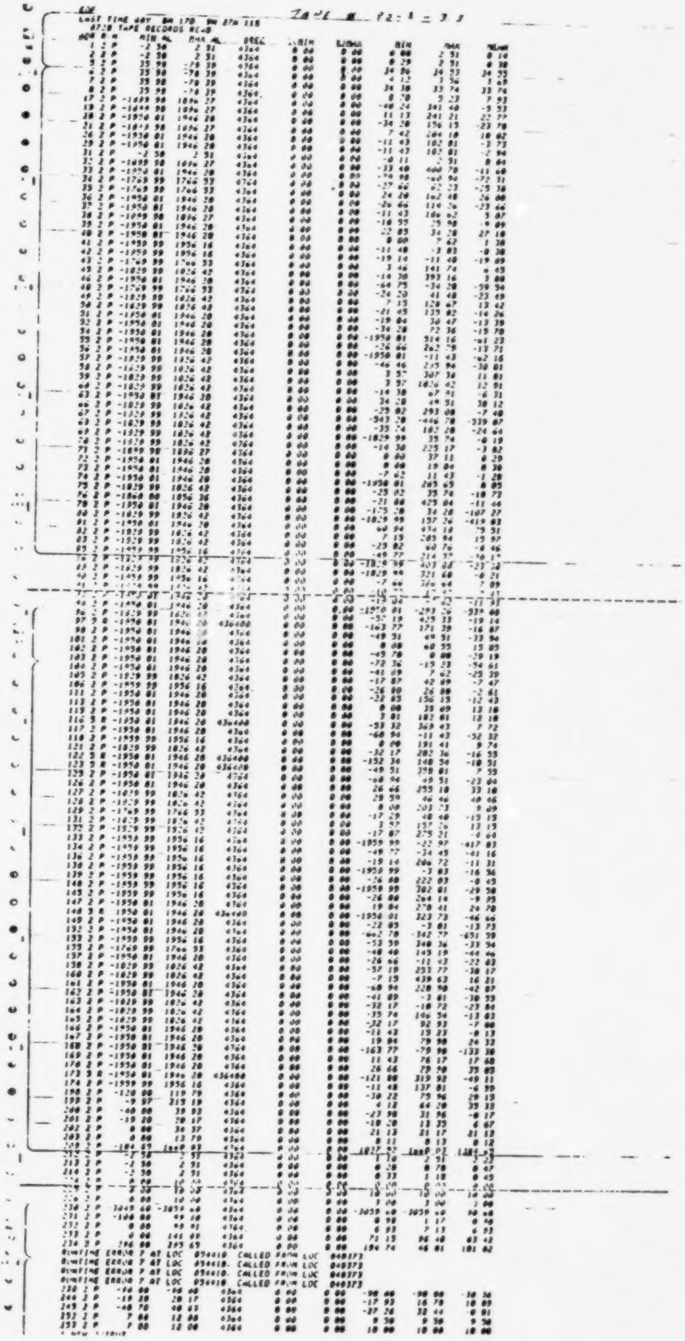
ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:

RECORDING NOTES
MODE RECORDING ☒
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING 80-V1 TAPE Nº:
TIME : 08:16 TO 09:28 GMT
PHOTOS =
TO

COMMENTS



VOYAGE RECORDS

INDEX Nº 80-1-3.2
YR.-VOYAGE-TAPE FILE

DATE 17th August, 1980
RECORDING TIME 10:04:10 TO 10:07:43 GMT
ELAPSED TIME H 3 M 33 S

CONTRACTOR : Fenco Consultants Ltd.
FINAL REPORT Nº 3202 TP

LOCATION Barrow Strait
LAT : 74 ° 45 'N
LONG : 96 ° 00 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: 9.8 M
CARGO ☒
BALLAST ☐
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				
ICE COVER 1Y | 2Y+MY | TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING				

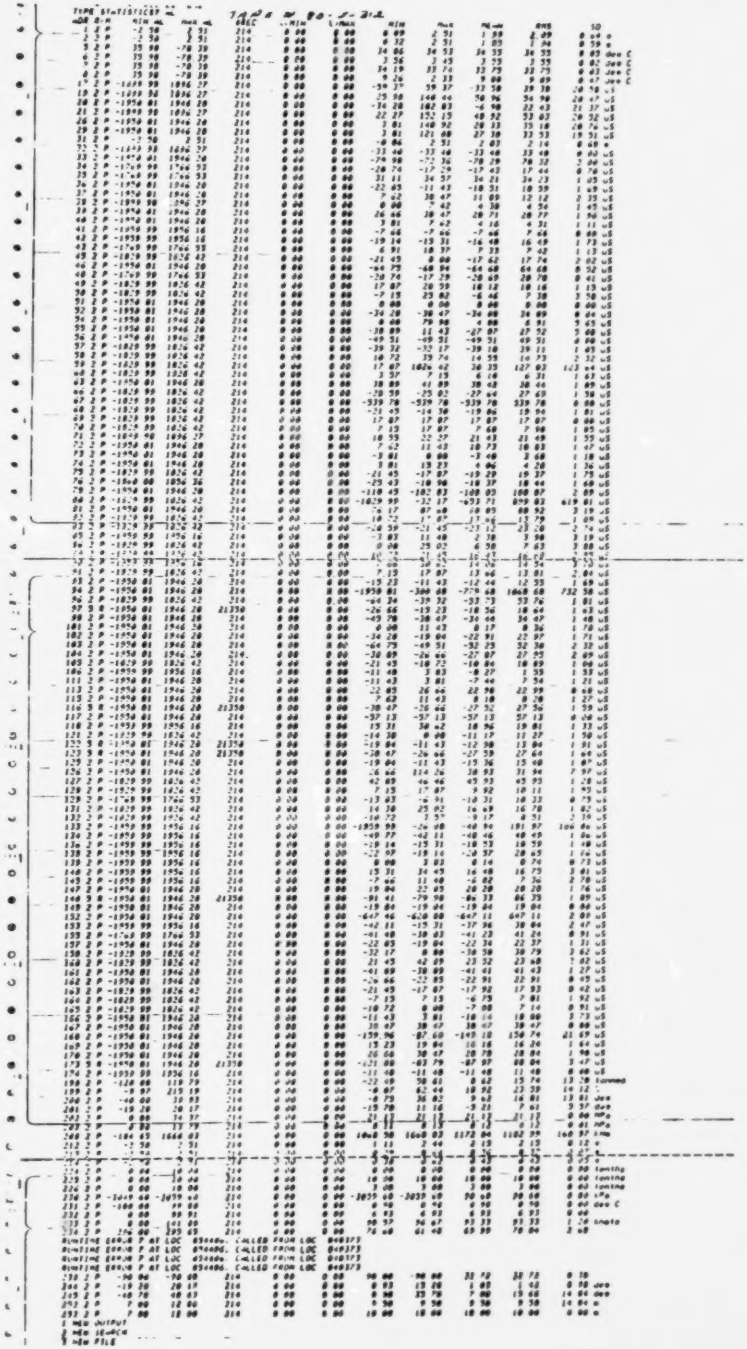
ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:

RECORDING NOTES
MODE RECORDING ☒
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS
No information in report



VOYAGE RECORDS

INDEX Nº 80-1-3.3
YR. - VOYAGE - TAPE FILE

DATE 17th August, 1980

RECORDING TIME 10:07:55 TO 10:08:07 GMT

ELAPSED TIME H M S 12

CONTRACTOR : Fenco Consultants Ltd.

FINAL REPORT Nº 3202 TP

LOCATION Barrow Strait

LAT : 74 ° 45 'N

LONG : 96 ° 00 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M

AFT: 9.8 M

CARGO ☐

BALLAST ☐

BUBBLER ON ☐

OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				
ICE COVER 1Y 2Y+MY TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐

NAME

FOLLOWING ☐

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN:

RECORDING NOTES

MODE RECORDING ☒

STANDBY ☐

INTERVAL= SECS

TAPE INFO HEADER ☐

EOF ☐

OMIT CHANNELS: (SEE APPENDIX A)

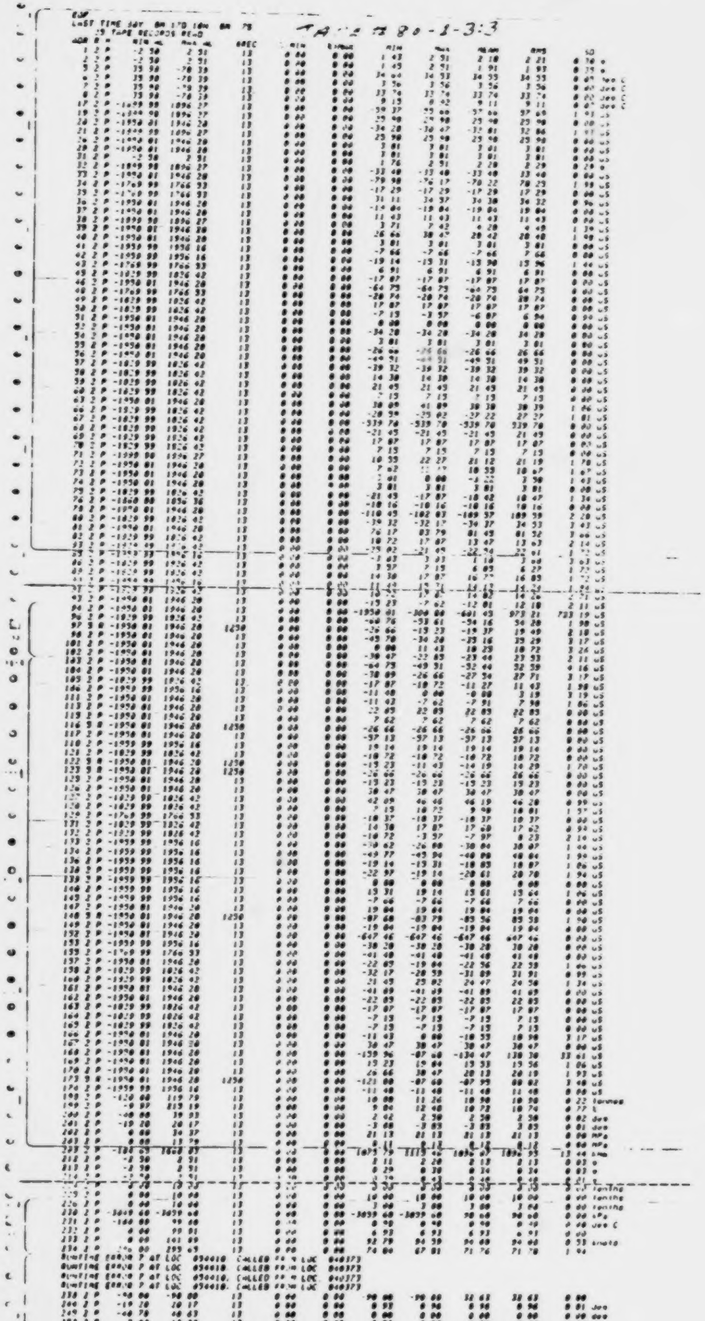
VIDEO RECORDING TAPE Nº:

TIME : TO GMT

PHOTOS = # TO

COMMENTS

No information in report



TAPE # 80-1-3:3

VOYAGE RECORDS

INDEX Nº 80-1-4.1
YR. - VOYAGE - TAPE FILE

DATE 17th August 1980
RECORDING TIME 13:38 TO 14:50 GMT
ELAPSED TIME 1 H 12 M S

CONTRACTOR : Fenco Consultants Ltd.
FINAL REPORT Nº 3202 TP

LOCATION McDougall Sound
LAT : 75 ° 00 'N
LONG : 97 ° 30 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☒
BALLAST ☐
BUBBLER ON ☐
OFF ☒
ERPM = 310

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM									
ICE COVER 1Y 2Y+MY TOT	TENTHS		*	9	0	9	10	0	10	
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

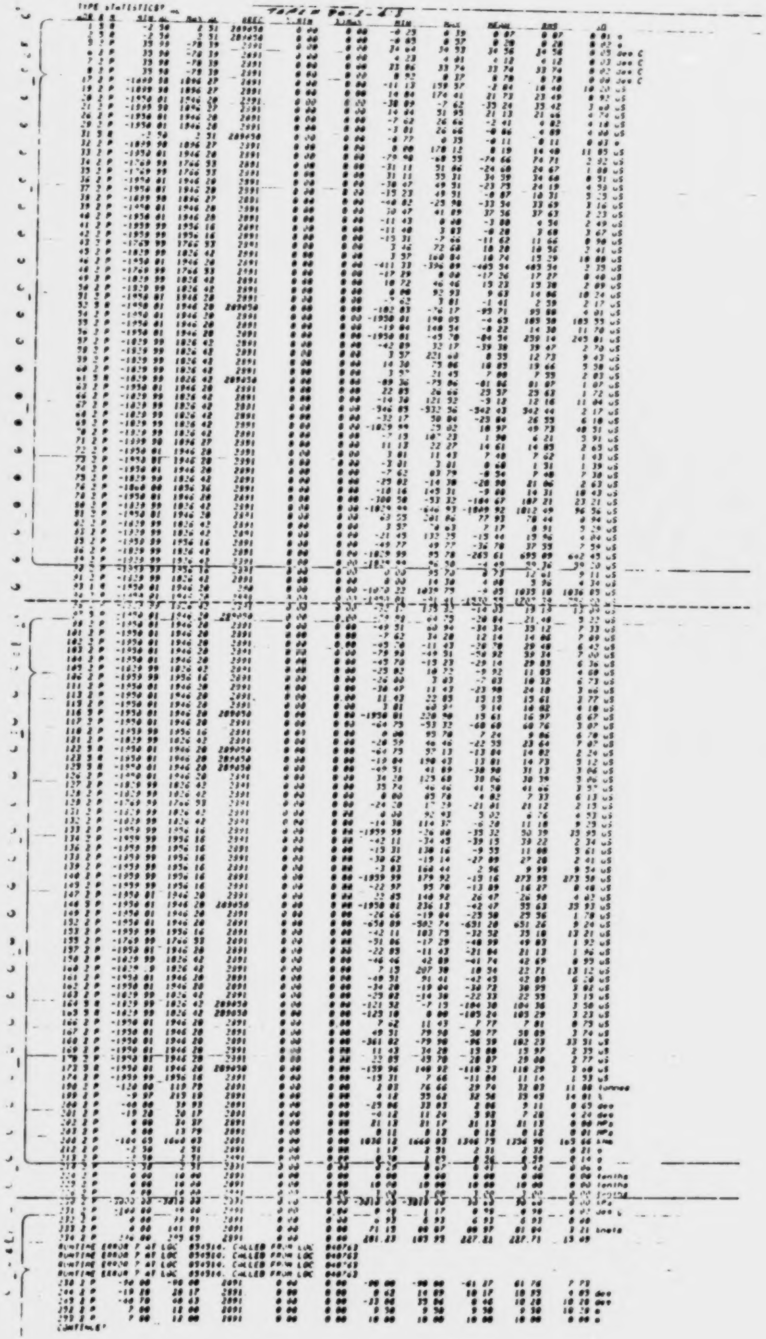
ICEBREAKER SUPPORT ☐
NAME CCGS Franklin
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:

RECORDING NOTES
MODE RECORDING ☒
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING 80-V1
TAPE Nº:
TIME : 13:38 TO 14:50 GMT
PHOTOS =
TO

COMMENTS



VOYAGE RECORDS

INDEX Nº 80-1-5.1
YR. – VOYAGE – TAPE FILE

DATE 17th August 1980
RECORDING TIME 15:10 TO 15:27 GMT
ELAPSED TIME H 17 M S

CONTRACTOR : Fenco Consultants Ltd.
FINAL REPORT Nº 3202 TP

LOCATION McDougall Sound
LAT : 75 ° 15 'N
LONG : 97 ° 00 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 9.8 M
AFT: M
CARGO ☒
BALLAST ☐
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				
ICE COVER 1Y 2Y+MY TOT	TENTHS		*	9 0 9	
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

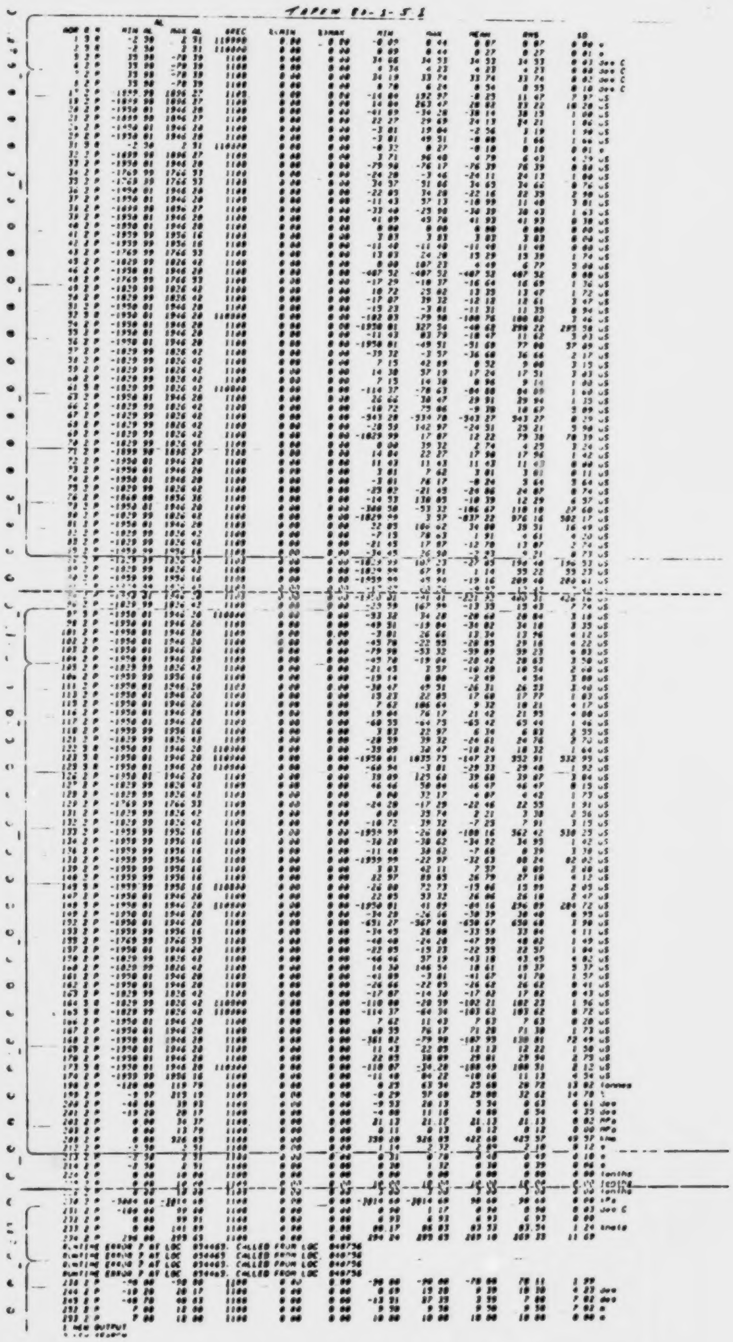
ICEBREAKER SUPPORT ☒
NAME CCGS Franklin
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:

RECORDING NOTES
MODE RECORDING ☒
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING 80-V1 TAPE Nº:
TIME : 15:10 TO 15:27 GMT
PHOTOS =
TO

COMMENTS



VOYAGE RECORDS

INDEX Nº 80-1-5.2
YR. – VOYAGE – TAPE FILE

DATE 17th August 1980 RECORDING TIME 15:31 TO 16:05 GMT
ELAPSED TIME 0 H 34 M S

CONTRACTOR : Fenco Consultants Ltd.
FINAL REPORT Nº 3202 TP

LOCATION McDougall Sound
LAT : 75 ° 15 'N
LONG : 97 ° 00 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: 9.8 M
CARGO ☒
BALLAST ☐
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				
ICE COVER 1Y 2Y+MY TOT	TENTHS		*	9 0 9	
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

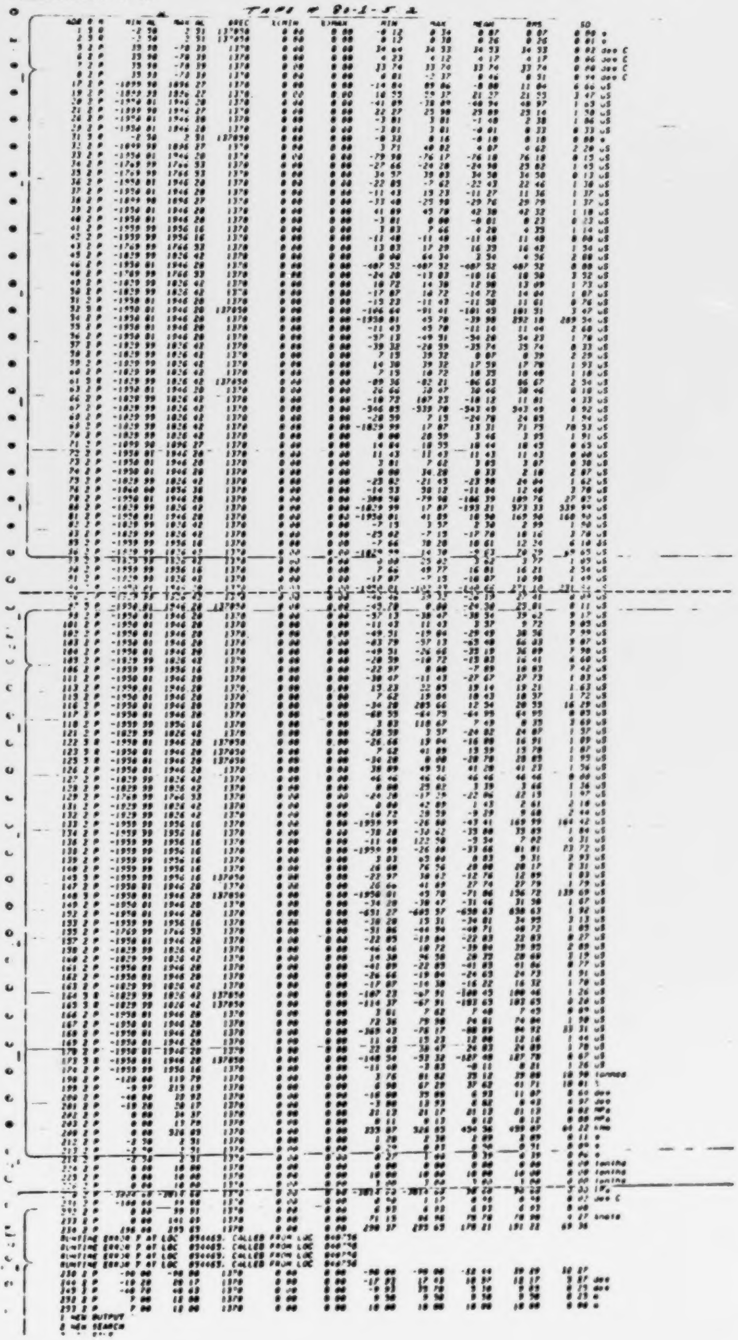
ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:

RECORDING NOTES
MODE RECORDING ☒
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS


TAPE # 80-1-5.2

VOYAGE RECORDS

INDEX Nº 80-2-6.1
YR. - VOYAGE - TAPE FILE

DATE 4th September 1980

RECORDING TIME 21:14 TO 22:42 GMT
ELAPSED TIME 1 H 28 M S

CONTRACTOR : Fenco Consultants Ltd.

FINAL REPORT Nº 3202 TP

LOCATION Barrow Strait

LAT : 74 ° 30 'N
LONG : 94 ° 00 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.8 M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	62	91	Unconsolidated pack ice
ICE COVER IY 2Y+MY TOT	TENTHS		*	10		
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

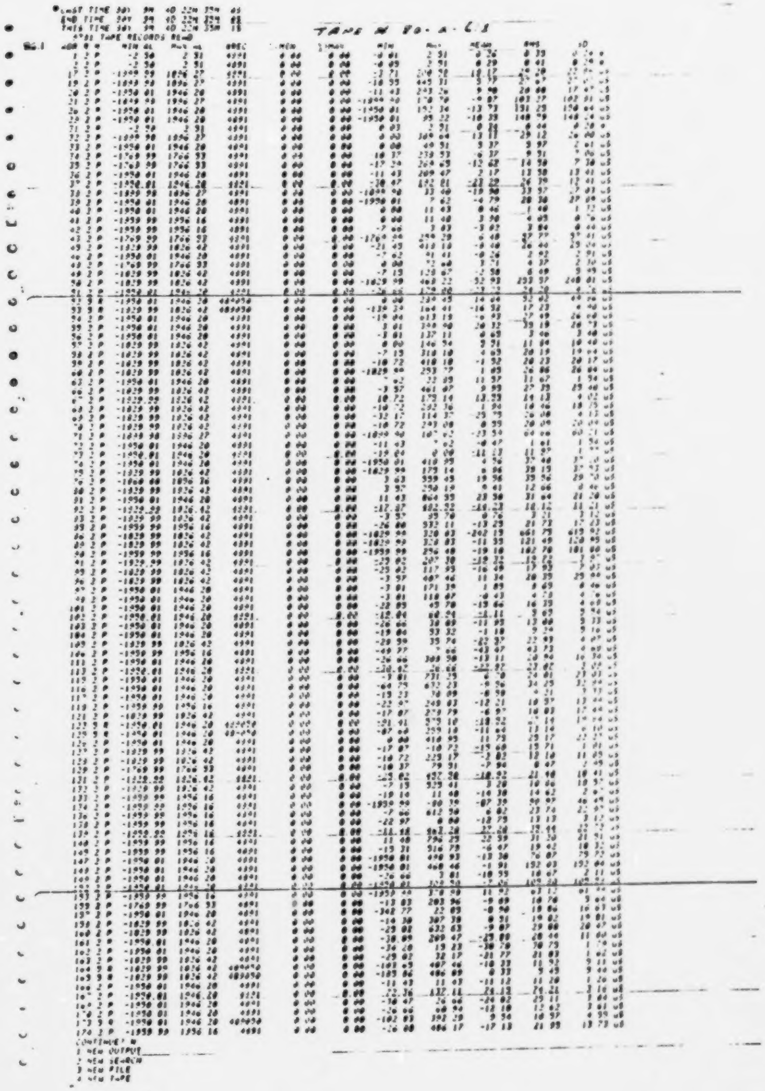
RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐
TAPE INFO HEADER ☐
INTERVAL= SECS
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING 80-V1 TAPE Nº:
TIME : 21:14 TO 22:42 GMT
PHOTOS =
TO

COMMENTS



VOYAGE RECORDS

INDEX Nº 80-2-7.1
YR. - VOYAGE - TAPE FILE

DATE 4th September 1980 RECORDING TIME 22:53 TO 23:16 GMT
ELAPSED TIME 0 H 23 M S

CONTRACTOR : Fenco Consultants Ltd. FINAL REPORT Nº 3202 TP

LOCATION Barrow Strait LAT : 74 ° 31 'N
LONG : 93 ° 00 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.8 M CARGO ☐ BUBBLER ON ☐
AFT: M BALLAST ☒ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	62	
ICE COVER 1Y 2Y+MY TOT	TENTHS		*	2	Pack ice
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

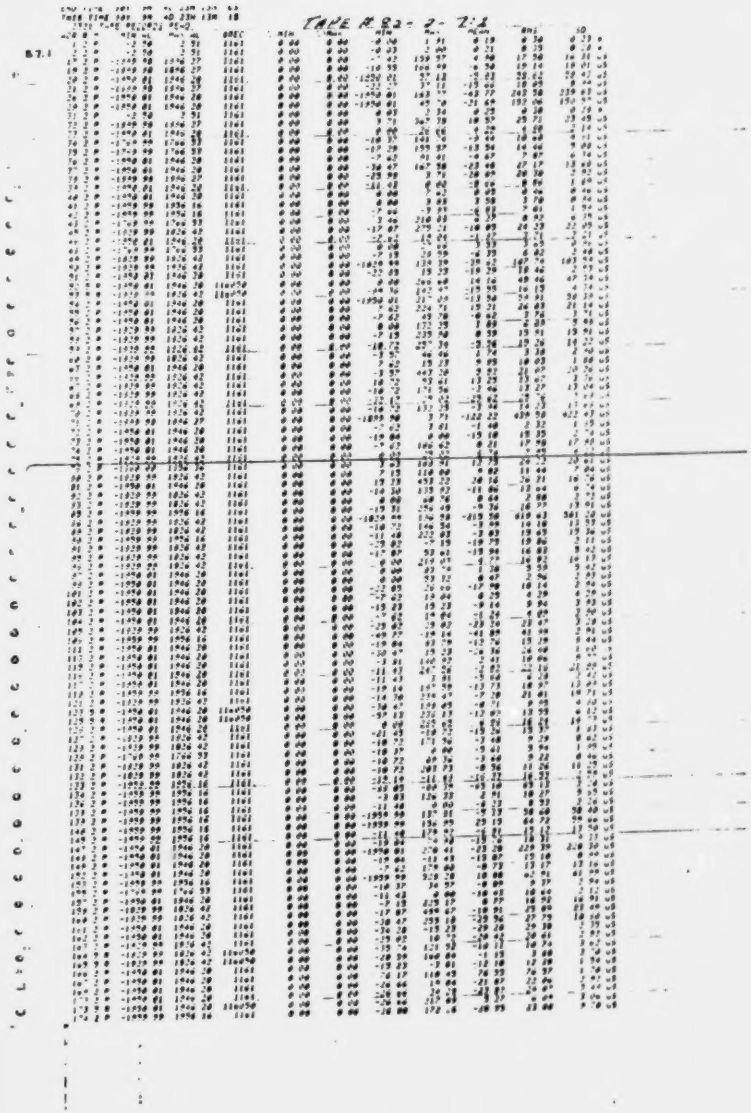
ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:

RECORDING NOTES
MODE RECORDING ☒
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS



VOYAGE RECORDS

INDEX Nº 80-2-7.2
YR.-VOYAGE-TAPE FILE

DATE: 4/5th September 1980

RECORDING TIME: 23:22 TO 03:14 GMT

ELAPSED TIME: 3 H 52 M S

CONTRACTOR: Fenco Consultants Ltd.

FINAL REPORT Nº 3202 TP

LOCATION: Barrow Strait

LAT: 74 ° 31 'N

LONG: 93 ° 00 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: 10.8 M

AFT: M

CARGO ☐

BALLAST ☒

BUBBLER ON ☐

OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	62	Pack ice
ICE COVER: 1Y / 2Y+MY / TOT	TENTHS		*	2	Mean floe size 6.1 m
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐

NAME

FOLLOWING ☐

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN:

RECORDING NOTES

MODE: RECORDING ☐

STANDBY ☒

INTERVAL= 15 SECS

TAPE INFO: HEADER ☐

EOF ☐

OMIT CHANNELS: (SEE APPENDIX A)

VIDEO RECORDING 80-V1

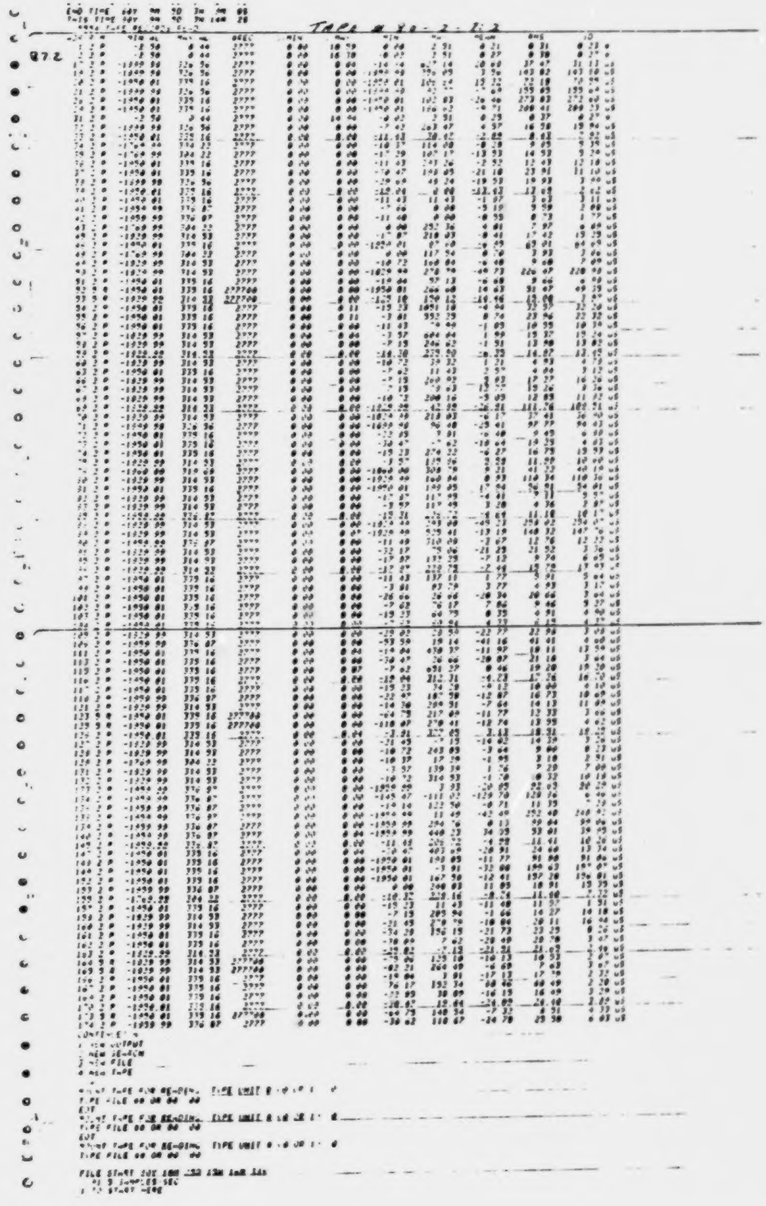
TAPE Nº:

TIME: 23:22 TO 03:14 GMT

PHOTOS =

TO

COMMENTS


TAPE # 80-2-7.2

VOYAGE RECORDS

INDEX Nº 80-2-8.1
YR. - VOYAGE - TAPE FILE

DATE 8th September 1980
RECORDING TIME 00:16 TO 00:27 GMT
ELAPSED TIME 0 H 11 M S

CONTRACTOR : Fenco Consultants Ltd.
FINAL REPORT Nº 3202 TP

LOCATION Lancaster Sound
LAT : 73 ° 40 'N
LONG : 84 ° 00 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.8 M
AFT: M
CARGO ☒
BALLAST ☐
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	244	305	Multi year floes 91 m across
ICE COVER IY 2Y+MY TOT	TENTHS					
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

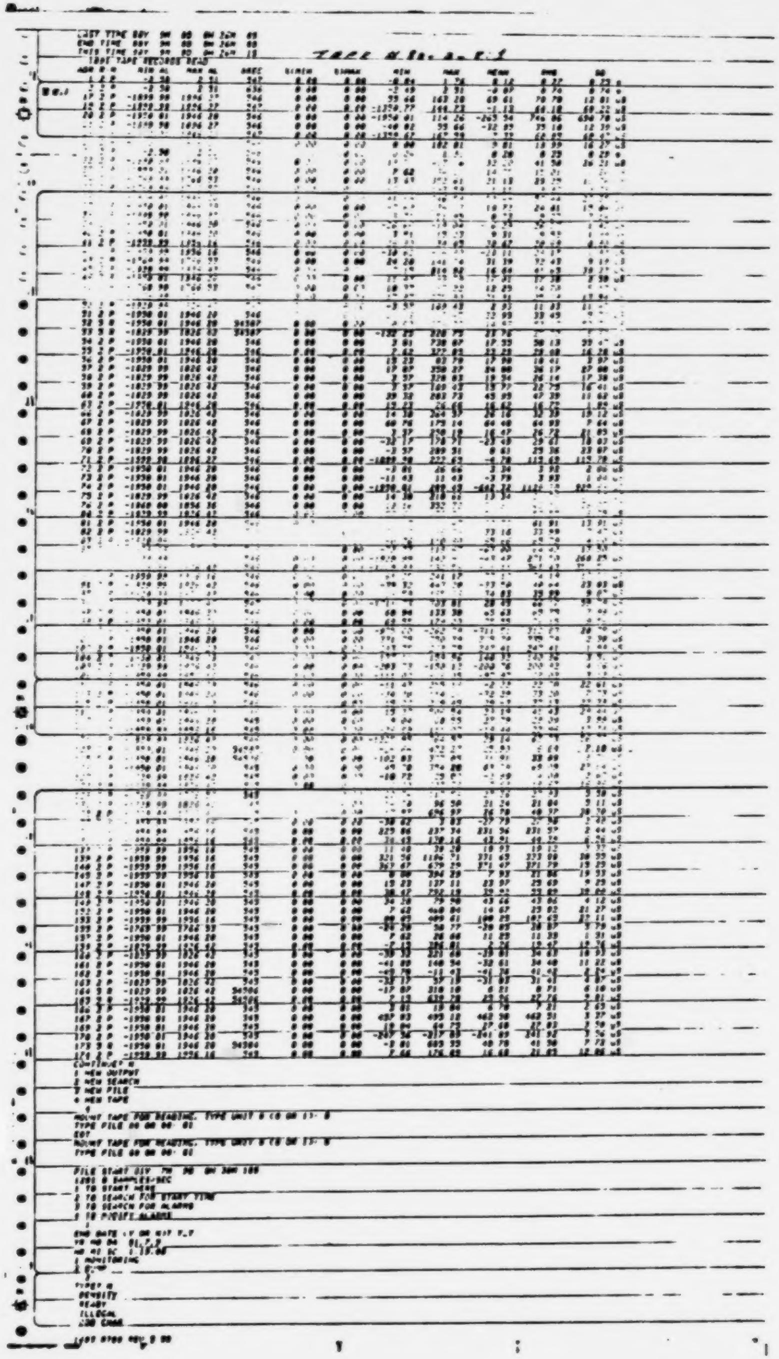
ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:

RECORDING NOTES
MODE RECORDING ☒
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING 80-V1
TAPE Nº:
TIME : 00:20 TO 00:27 GMT
PHOTOS =
TO

COMMENTS



VOYAGE RECORDS

INDEX Nº 80-2-8.2
YR.-VOYAGE-TAPE FILE

DATE: 8th September 1980
RECORDING TIME 00:37 TO 01:56 GMT
ELAPSED TIME 1 H 19 M S

CONTRACTOR: Fenco Consultants Ltd.
FINAL REPORT Nº 3202 TP

LOCATION: Lancaster Sound
LAT: 73 ° 40 'N
LONG: 84 ° 00 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.8 M
AFT: M
CARGO ☒
BALLAST ☐
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	244	305	Multiyear floes 91 m across
ICE COVER 1Y / 2Y+MY / TOT	TENTHS					
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

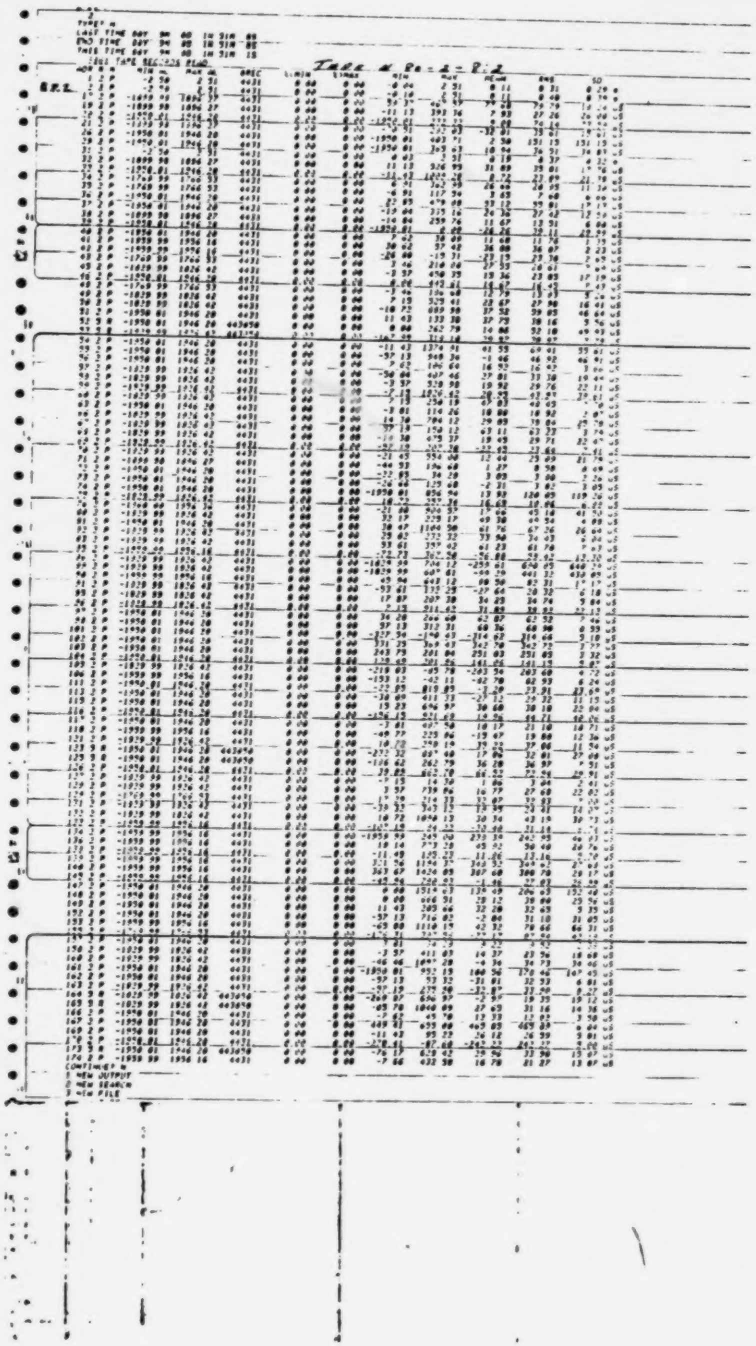
ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:

RECORDING NOTES
MODE RECORDING ☒
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING 80-V1, 80-V3 TAPE Nº:
TIME: 00:37 TO 00:47 GMT
01:03 TO 01:56
PHOTOS =
TO

COMMENTS



Tape # 80-2-8.2

VOYAGE RECORDS

INDEX Nº 80-2-9.1
YR.-VOYAGE-TAPE FILE

DATE 8th September 1980
RECORDING TIME 02:09 TO 03:09 GMT
ELAPSED TIME 1 H 0 M S

CONTRACTOR : Fenco Consultants Ltd.
FINAL REPORT Nº 3202 TP

LOCATION Lancaster Sound
LAT : 73 ° 50 'N
LONG : 83 ° 00 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.8 M
AFT: M
CARGO ☒
BALLAST ☐
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	244	305	Multiyear floes
ICE COVER 1Y 2Y+MY TOT	TENTHS					
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

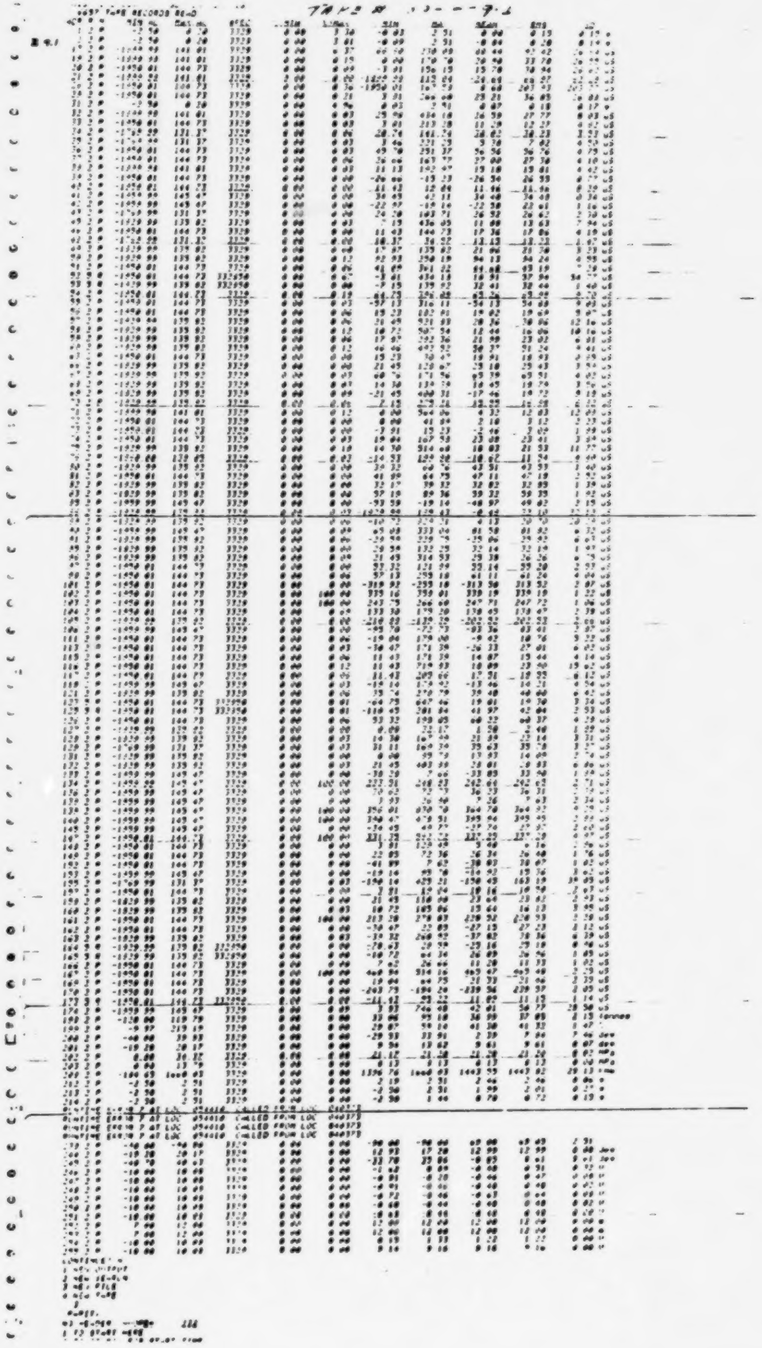
ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☒ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING 80-V3 TAPE Nº:
TIME : 02:09 TO 02:10 GMT
PHOTOS =
TO

COMMENTS Recorded continuously due to offsets in S/G



VOYAGE RECORDS	INDEX Nº 80-2-9.2 YR.-VOYAGE-TAPE FILE

DATE 8th September 1980 RECORDING TIME 03:09 TO 03:37 GMT
ELAPSED TIME H 28 M S

CONTRACTOR: Fenco Consultants Ltd. FINAL REPORT Nº 3202 TP

LOCATION Lancaster Sound LAT: 73 ° 50 'N
LONG: 83 ° 00 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☒ BUBBLER ON ☐
AFT: 10.8 M BALLAST ☐ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	244	305	Multiyear floes
ICE COVER 1Y 2Y+MY TOT	TENTHS					
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

CHANNEL / MODE	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

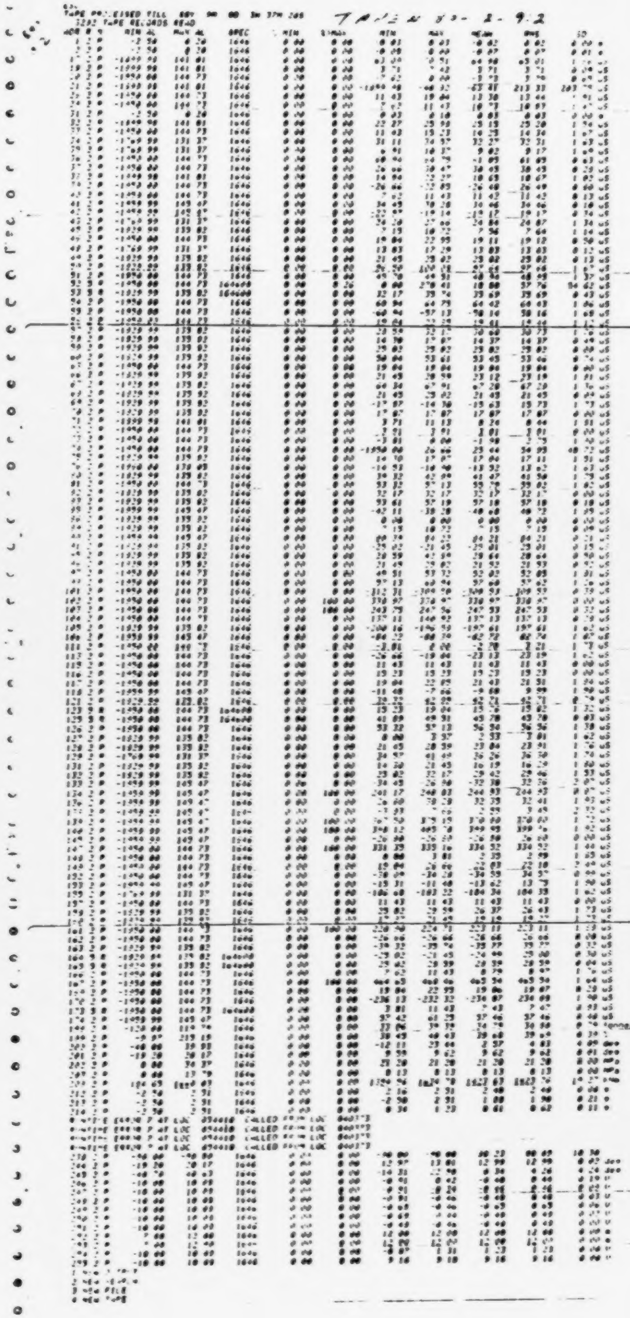
ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:

RECORDING NOTES
MODE RECORDING ☒
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME: TO GMT
PHOTOS =
TO

COMMENTS


TAPE Nº 80-2-9.2

VOYAGE RECORDS

INDEX Nº 80-4-10.1
YR. – VOYAGE – TAPE FILE

DATE 3rd October 1980
RECORDING TIME 06:07 TO 07:08 GMT
ELAPSED TIME 1 H 1 M S

CONTRACTOR : Fenco Consultants Ltd.
FINAL REPORT Nº 3202 TP

LOCATION Strathcona Sound
LAT : 73 ° 10 'N
LONG : 85 ° 00 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.5 M
AFT: 11.3 M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐ OFF ☒
ERPM = 400

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	3	5	New ice
ICE COVER IY 2Y+MY TOT	TENTHS		*	2	9	3 m floe size
SNOW COVER	CM					Light snowfall
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

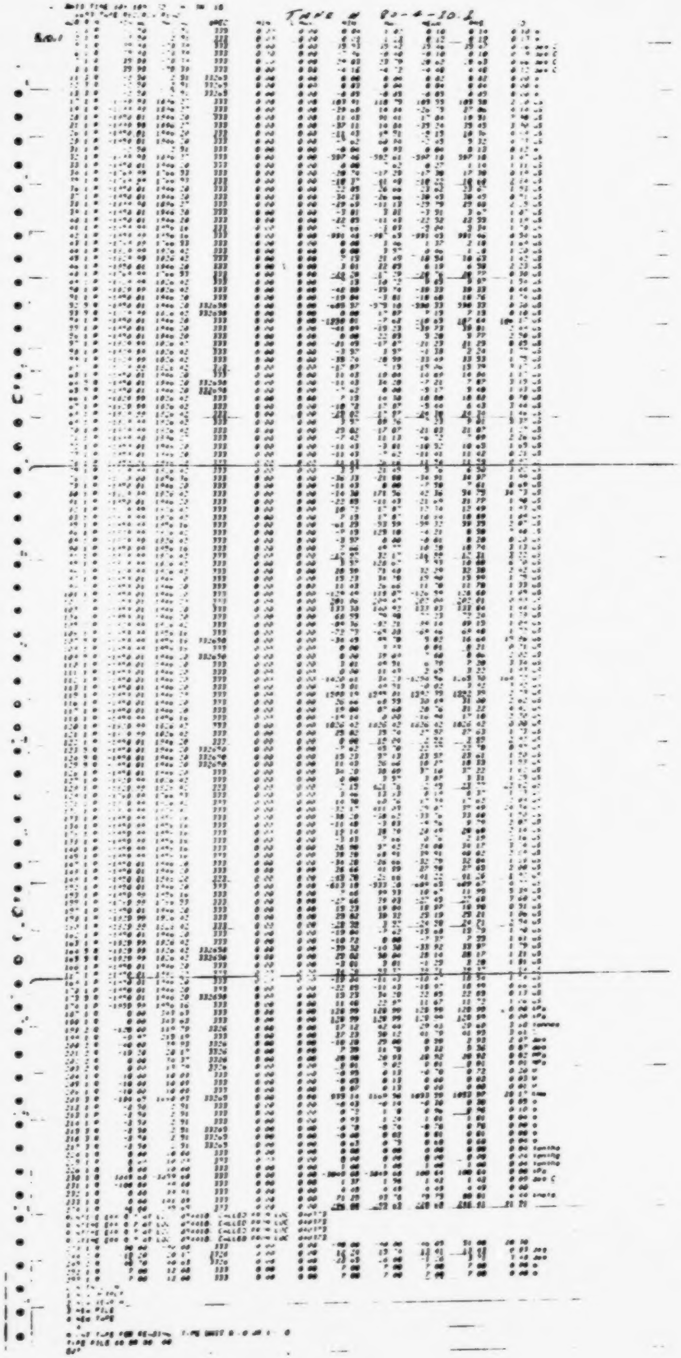
ICEBREAKER SUPPORT ☒
NAME CCGS Franklin
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:

RECORDING NOTES
MODE RECORDING ☒
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS



Tape # 80-4-10.1

VOYAGE RECORDS

INDEX Nº 80-4-11.1
YR. – VOYAGE – TAPE FILE

DATE: 3rd October 1980
RECORDING TIME 07:18 TO 07:43 GMT
ELAPSED TIME 0 H 25 M S

CONTRACTOR : Fenco Consultants Ltd.
FINAL REPORT Nº 3202 TP

LOCATION Admiralty Inlet
LAT : 73 ° 19 'N
LONG : 85 ° 19 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.8 M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE					COMMENTS
ICE THICKNESS	CM								
ICE COVER 1Y | 2Y+MY | TOT	TENTHS		*	9	1	10		4	Consolidated pack ice Light snow shower
SNOW COVER	CM								
FLEXURAL STRENGTH	KPa								
COMPRESSIVE STRENGTH	MPa								
FRICTION									
PRESSURE	MPa								
RIDGES									
CRYSTAL									
SALINITY	%								

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

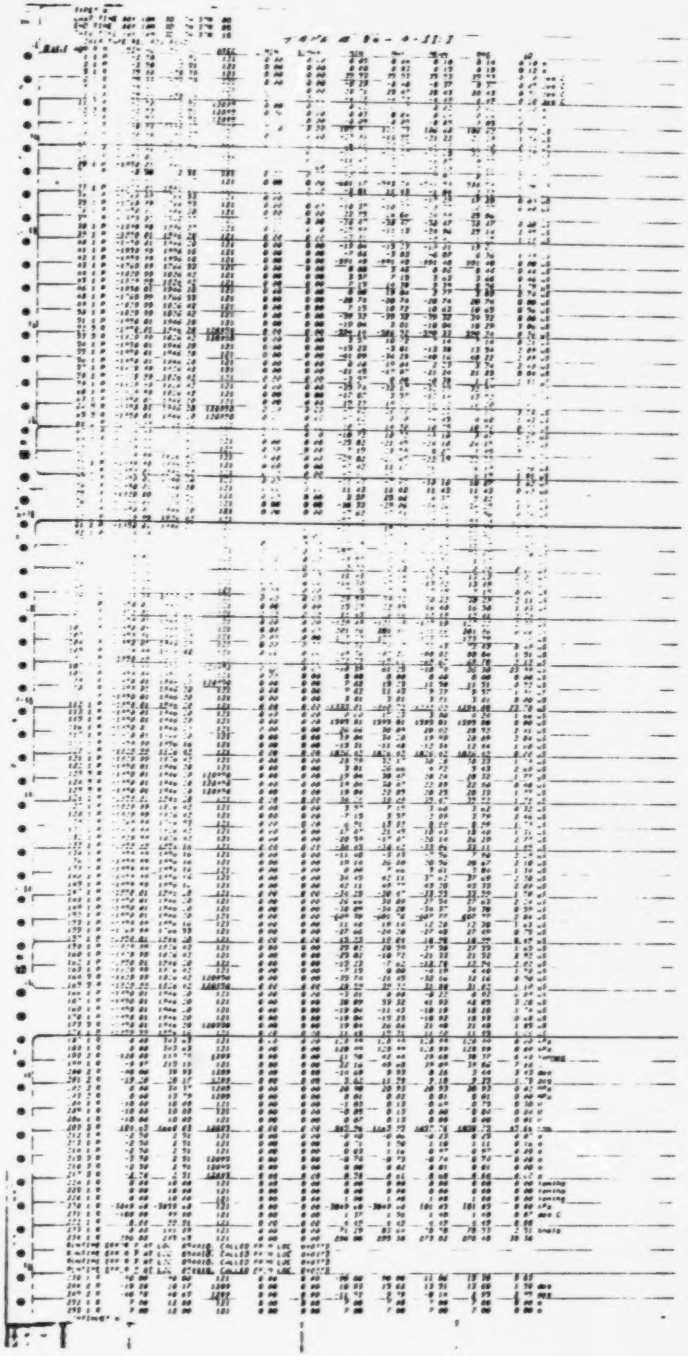
ICEBREAKER SUPPORT ☒
NAME CCGS Franklin
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:

RECORDING NOTES
MODE RECORDING ☒
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS


TAPE # 80-4-11.1

VOYAGE RECORDS

INDEX Nº 80-4-11.2
YR. - VOYAGE - TAPE FILE

DATE 3rd October 1980

RECORDING TIME 07:58 TO 08:31 GMT
ELAPSED TIME 0 H 33 M S

CONTRACTOR : Fenco Consultants Ltd.

FINAL REPORT Nº 3202 TP

LOCATION Admiralty Inlet

LAT : 73 ° 30 ' N
LONG : 85 ° 03 ' W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.8 M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM			4	100	Some multiyear pieces
ICE COVER 1Y 2Y+MY TOT	TENTHS			8	10	Medium snowfall
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*		*	
RAMMING				
ASTERN				
TURNING				

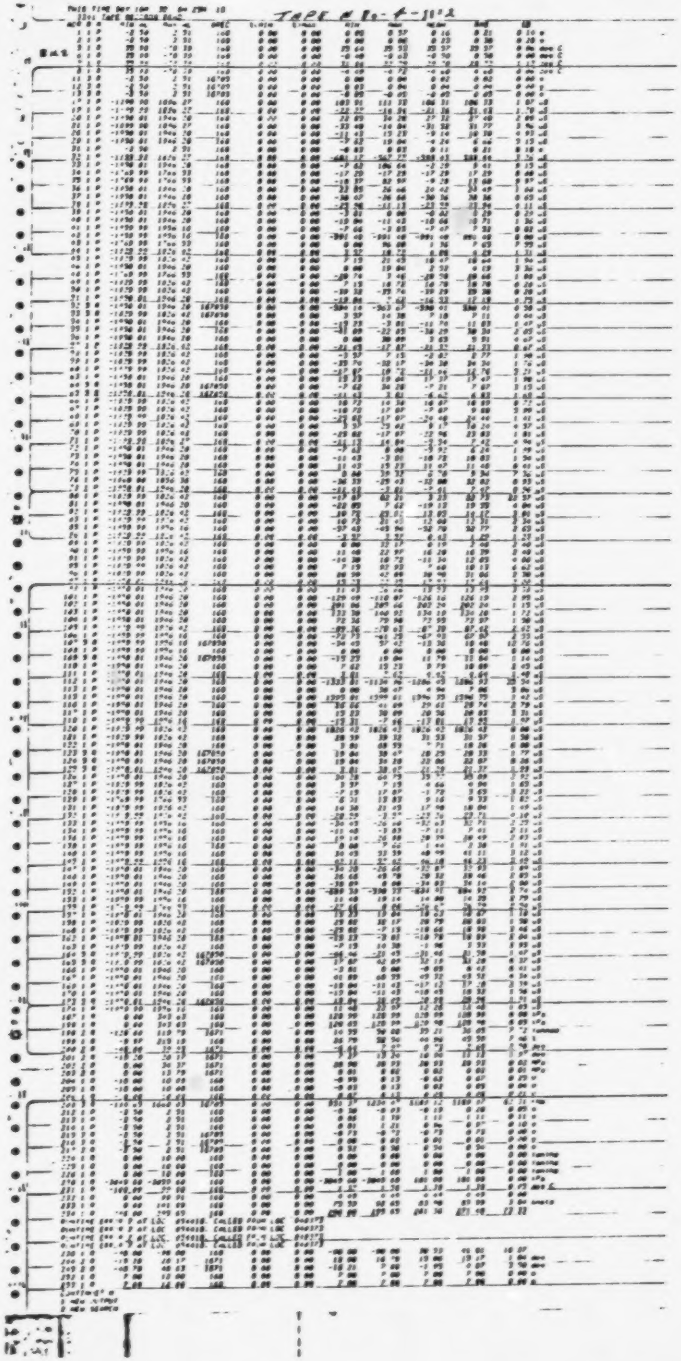
ICEBREAKER SUPPORT ☒
NAME CCGS Franklin
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:

RECORDING NOTES
MODE RECORDING ☒
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS


TAPE # 80-4-11.2

VOYAGE RECORDS

INDEX Nº 80-4-12.1
YR. – VOYAGE – TAPE FILE

DATE 3rd October 1980
RECORDING TIME 09:11 TO 09:24 GMT
ELAPSED TIME 0 H 13 M S

CONTRACTOR : Fenco Consultants Ltd.
FINAL REPORT Nº 3202 TP

LOCATION Admiralty Inlet
LAT : 73 ° 30 'N
LONG : 84 ° 20 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.8 M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM		*			20				
ICE COVER 1Y / 2Y+MY / TOT	TENTHS		*	9	1	10				
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

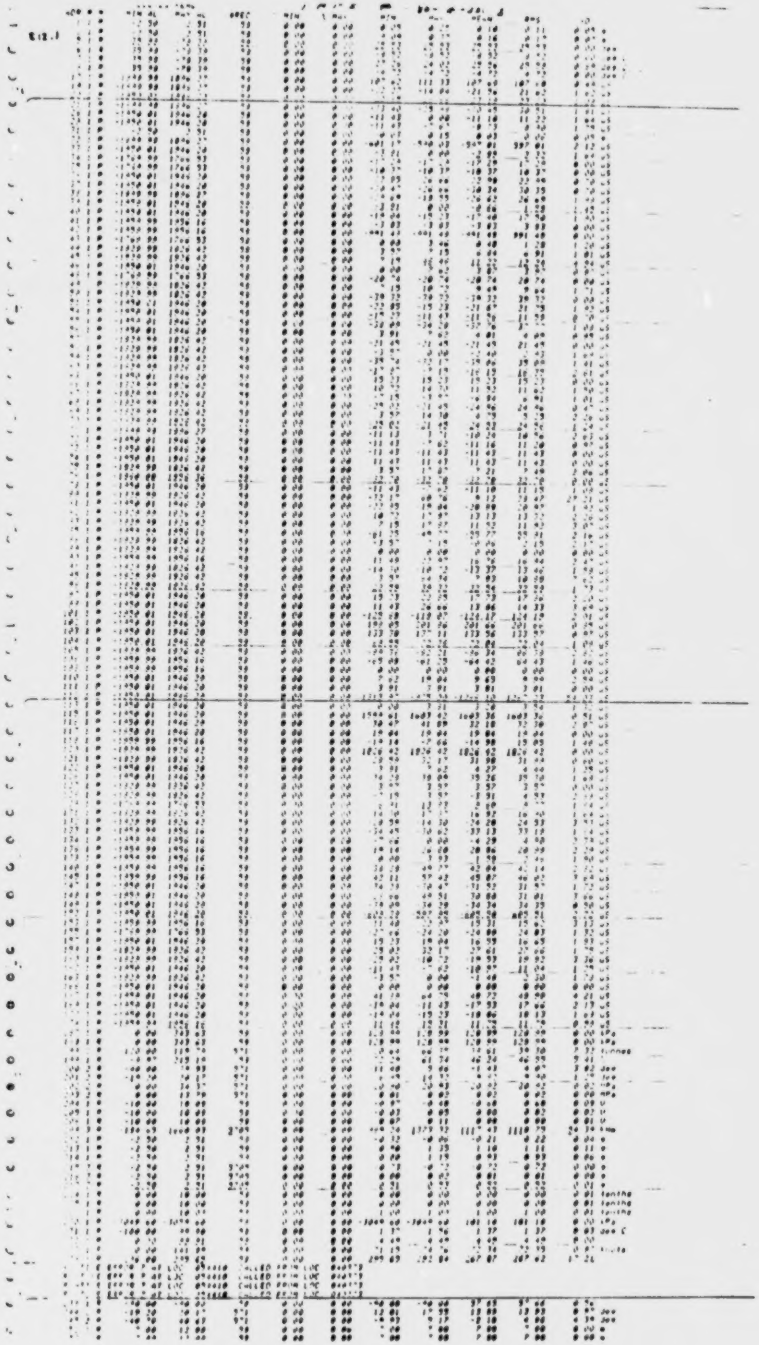
ICEBREAKER SUPPORT ☒
NAME CCGS Franklin
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:

RECORDING NOTES
MODE RECORDING ☒
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS



VOYAGE RECORDS

INDEX Nº
80-4-12.2
YR. - VOYAGE - TAPE FILE

DATE 3rd October 1980

RECORDING TIME 09:25 TO 12:25 GMT

ELAPSED TIME 3 H 0 M S

CONTRACTOR : Fenco Consultants Ltd.

FINAL REPORT Nº 3202 TP

LOCATION Admiralty Inlet

LAT : 73 ° 34 'N

LONG : 84 ° 20 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: 10.8 M

AFT: M

CARGO ☐

BALLAST ☒

BUBBLER ON ☐ OFF ☒

ERPM = 400

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	8 … 20	Consolidated pack ice Multiyear pieces
ICE COVER 1Y 2Y+MY TOT	TENTHS		*	9 1 10	
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*		*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒ up to 1000 h

NAME CCGS Franklin

FOLLOWING ☐

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN:

RECORDING NOTES

MODE RECORDING ☒

STANDBY ☐

INTERVAL= SECS

TAPE INFO HEADER ☐

EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

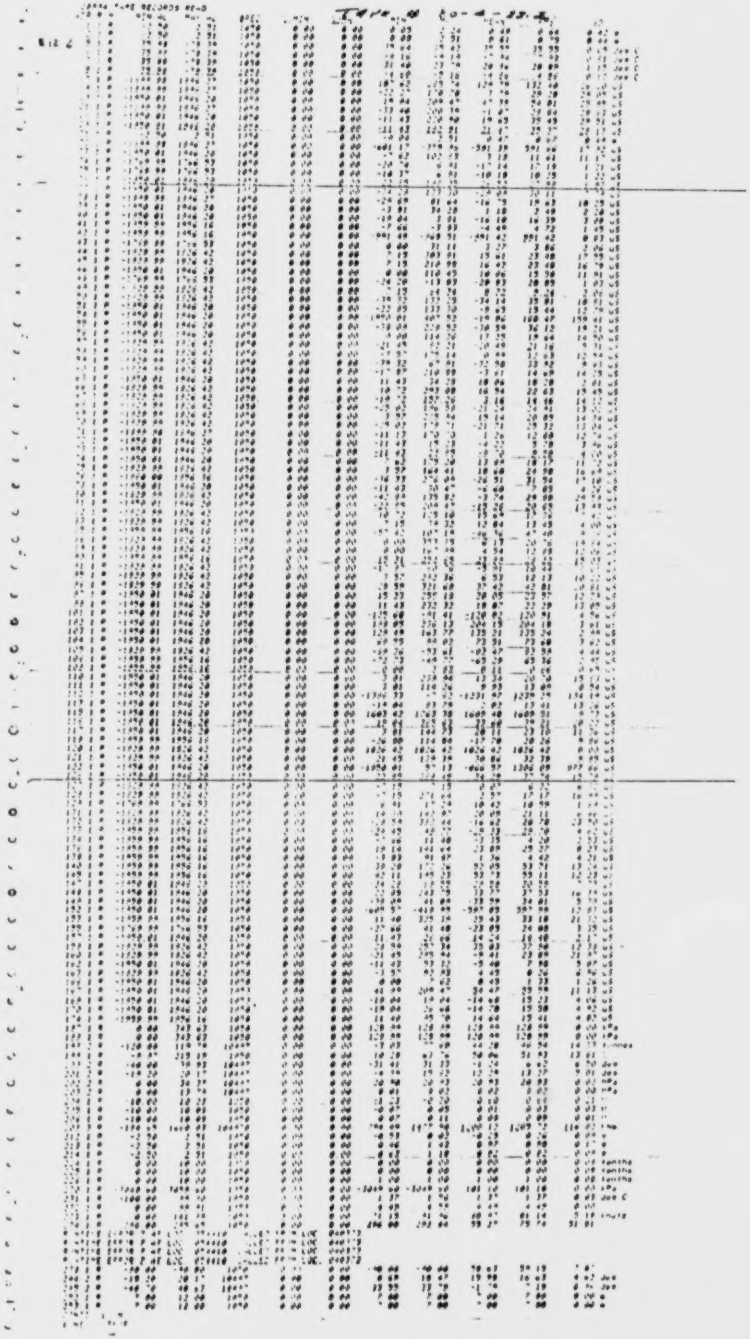
VIDEO RECORDING TAPE Nº:

TIME : TO GMT

PHOTOS =

# TO

COMMENTS



Tape # 80-4-12.2

VOYAGE RECORDS

INDEX Nº 80-4-12.3
YR. - VOYAGE - TAPE FILE

DATE: 3rd October 1980

RECORDING TIME 12:26 TO 12:51 GMT

ELAPSED TIME 0 H 25 M S

CONTRACTOR: Fenco Consultants Ltd.

FINAL REPORT Nº 3202 TP

LOCATION: Admiralty Inlet

LAT: 73 ° 30 'N

LONG: 84 ° 20 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: 10.8 M

AFT: M

CARGO ☐

BALLAST ☒

BUBBLER ON ☐ OFF ☒

ERPM = 400

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM			8	15	
ICE COVER 1Y | 2Y+MY | TOT	TENTHS		*	9 1 10		Multiyear pieces Light snow cover
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒

NAME

FOLLOWING ☒

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN:

RECORDING NOTES

MODE RECORDING ☒

STANDBY ☐

INTERVAL= SECS

TAPE INFO HEADER ☐

EOF ☐

OMIT CHANNELS: (SEE APPENDIX A)

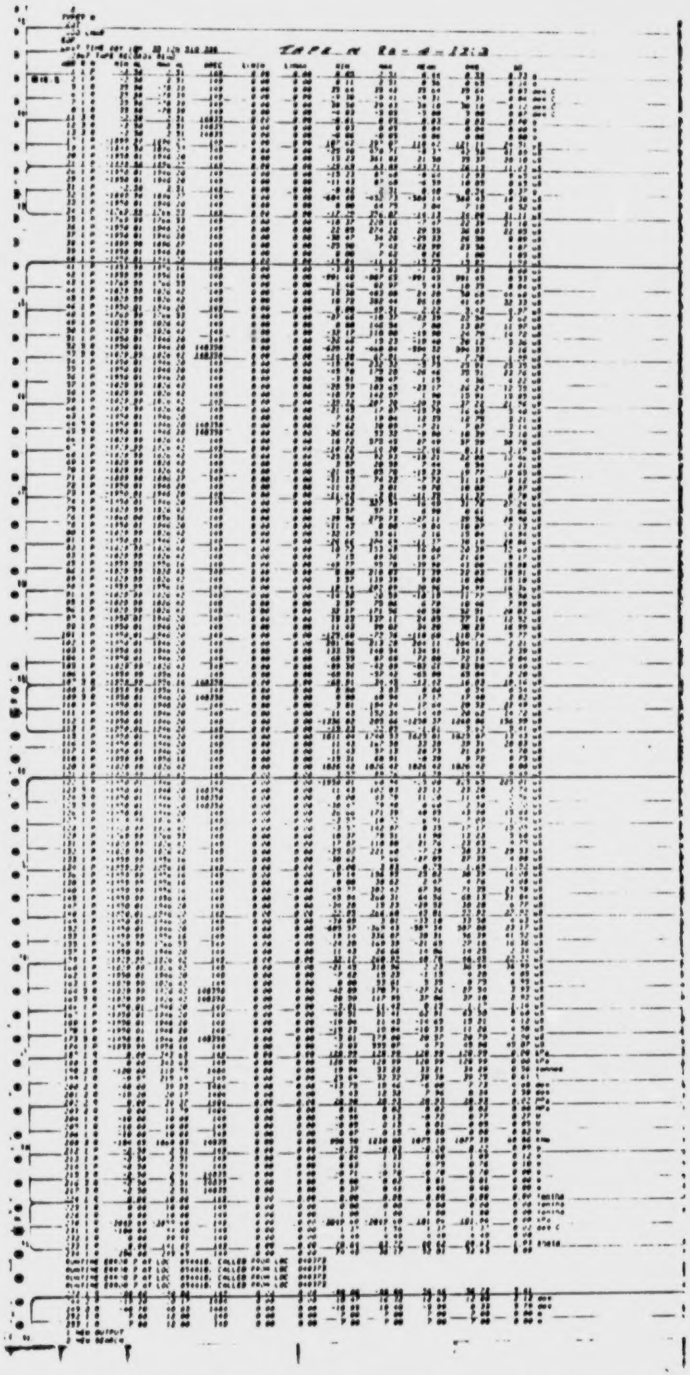
VIDEO RECORDING TAPE Nº:

TIME: TO GMT

PHOTOS =

TO

COMMENTS


TAPE № 80-4-12.3

VOYAGE RECORDS

INDEX Nº 80-4-13.1
YR. – VOYAGE – TAPE FILE

DATE 3rd October 1980

RECORDING TIME 12:55 TO 13:56 GMT

ELAPSED TIME 1 H 1 M S

CONTRACTOR : Fenco Consultants Ltd.

FINAL REPORT Nº 3202 TP

LOCATION Entering Lancaster Sound

LAT : 73 ° 47 'N

LONG : 83 ° 00 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M

AFT: 10.8 M

CARGO ☐

BALLAST ☒

BUBBLER ON ☐ OFF ☒

ERPM = 400

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	91	183	Consolidated pack ice with multiyear large ice floes. Snowfall commences 13:25 h
ICE COVER 1Y 2Y+MY TOT	TENTHS		*	10		
SNOW COVER	CM		*			
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES			*			
CRYSTAL SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐

NAME

FOLLOWING ☐

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN:

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐

INTERVAL= SECS

TAPE INFO HEADER ☐

EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

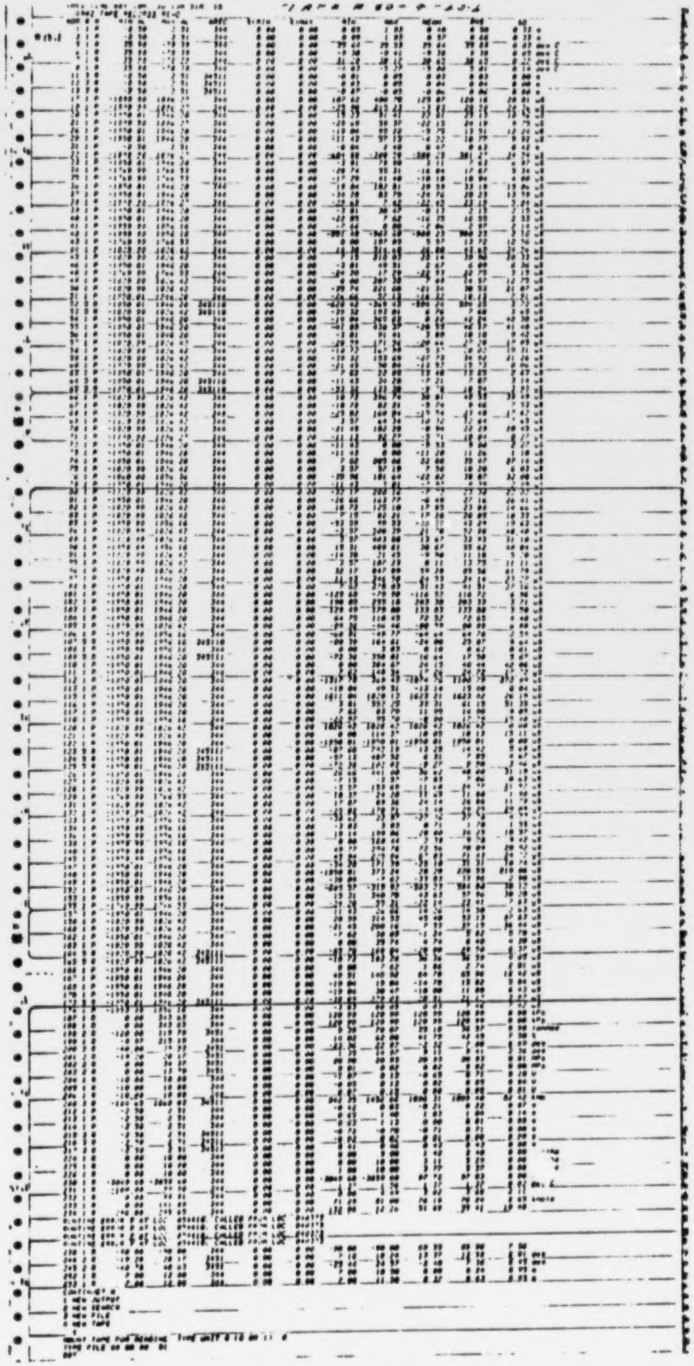
VIDEO RECORDING 80-V2 TAPE Nº:

TIME : 13:32 TO 13:56 GMT

PHOTOS = 5

# TO

COMMENTS



VOYAGE RECORDS

INDEX Nº 80-4-14.1
YR. – VOYAGE – TAPE FILE

DATE 3rd October 1980 RECORDING TIME 14:05 TO 19:35 GMT
ELAPSED TIME 5 H 30 M S

CONTRACTOR : Fenco Consultants Ltd. FINAL REPORT Nº 3202 TP

LOCATION Lancaster Sound LAT : 73 ° 49 'N LONG : 82 ° 08 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.8 M AFT: M CARGO ☐ BALLAST ☒ BUBBLER ON ☐ OFF ☒ ERPM = 400

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	40	200	Large second and Multiyear pieces
ICE COVER 1Y 2Y+MY TOT	TENTHS		*	10		
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

CHANNEL / MODE	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

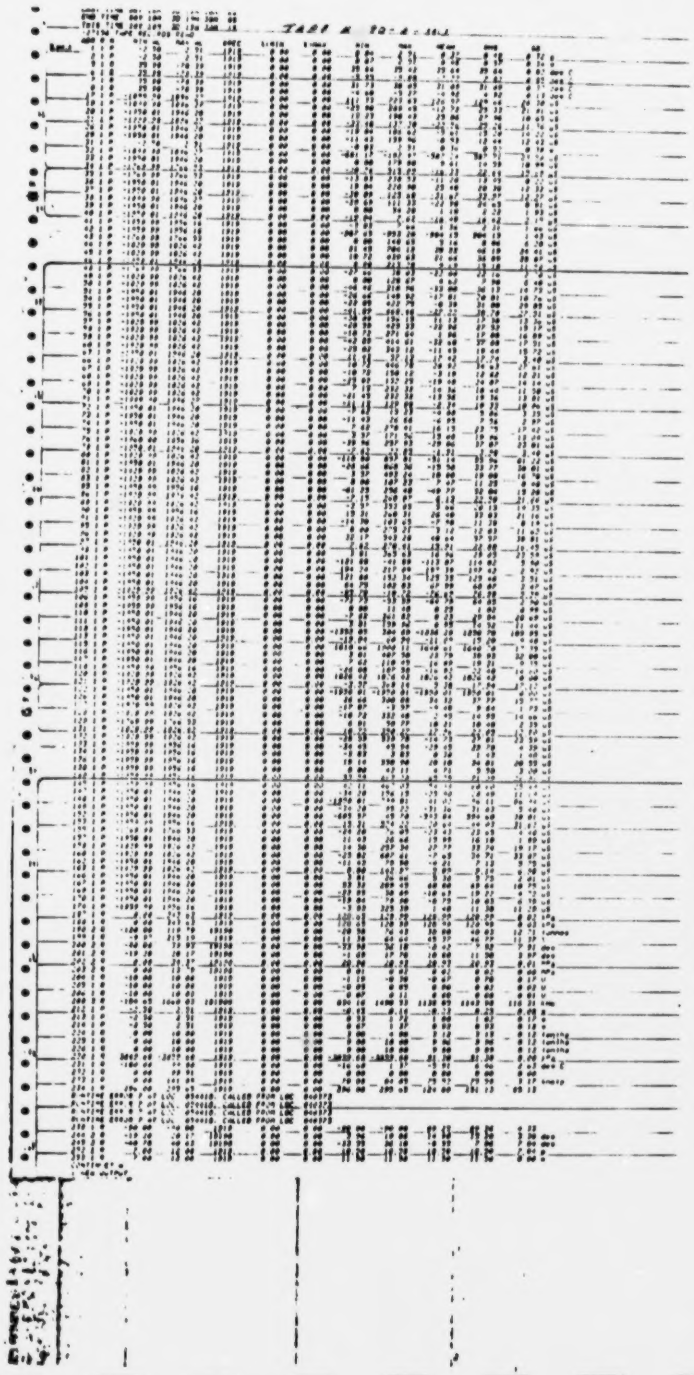
ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:

RECORDING NOTES
MODE RECORDING ☒
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING 80-V2 TAPE Nº:
TIME : 14:05 TO GMT
PHOTOS = 2
# TO

COMMENTS



VOYAGE RECORDS

INDEX Nº 80-5-15.1
YR. – VOYAGE – TAPE FILE

DATE 25th October 1980

RECORDING TIME 08:17 TO 12:52 GMT

ELAPSED TIME 4 H 35 M S

CONTRACTOR : Fenco Consultants Ltd.

FINAL REPORT Nº 3202 · TP

LOCATION Baffin Bay

LAT : 72 ° 20 'N

LONG : 73 ° 30 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: 11:05M

AFT: 10.29M

CARGO ☐

BALLAST ☒

BUBBLER ON ☐ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	8	30	Open pack ice
ICE COVER 1Y / 2Y+MY / TOT	TENTHS		*	8 0 8	9 0 9	Mean floe dia. 4 m
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐

NAME

FOLLOWING ☐

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN:

RECORDING NOTES

MODE RECORDING ☒

STANDBY ☐

INTERVAL= SECS

TAPE INFO HEADER ☐

EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

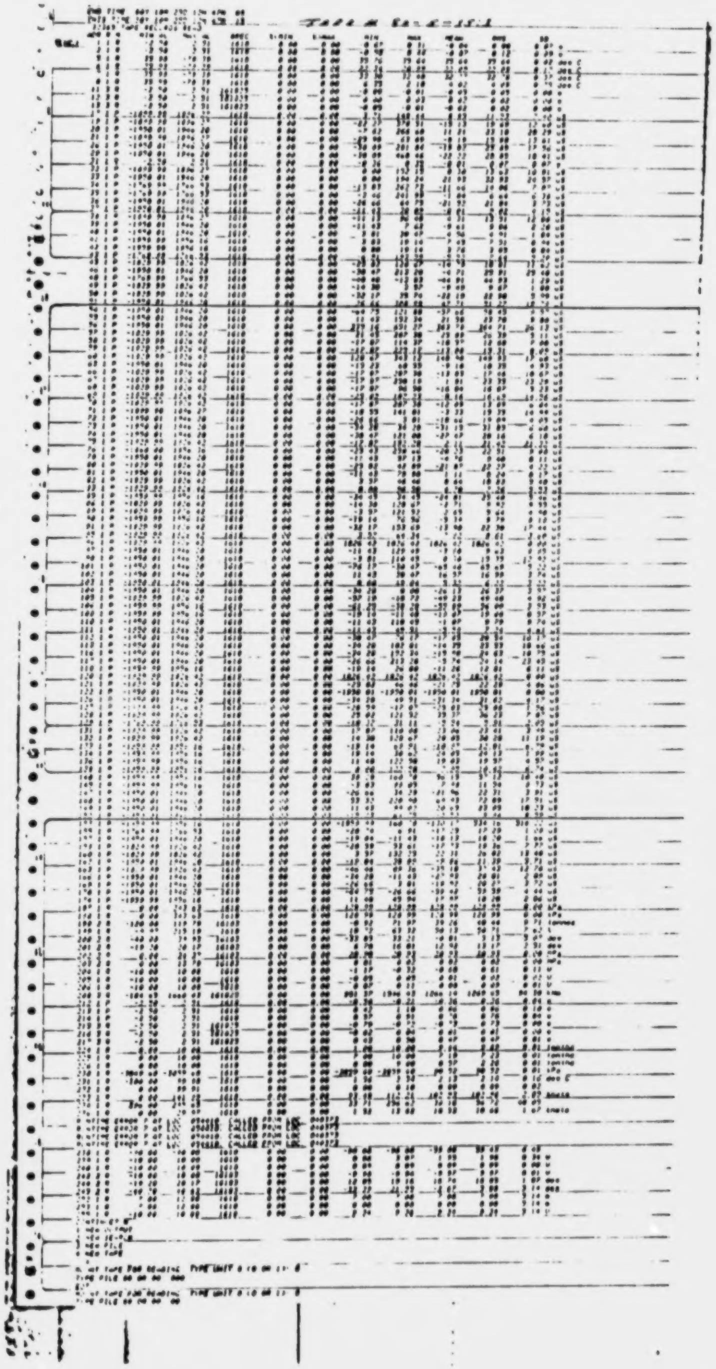
VIDEO RECORDING TAPE Nº:

TIME : TO GMT

PHOTOS =

TO

COMMENTS



VOYAGE RECORDS

INDEX Nº 80-5-16.1
YR. – VOYAGE – TAPE FILE

DATE 25th October 1980	RECORDING TIME 13:48 TO 14:28 GMT ELAPSED TIME 0 H 40 M S	
CONTRACTOR : Fenco Consultants Ltd.	FINAL REPORT Nº 3202 TP	
LOCATION Entrance to Pond Inlet	LAT : 72 ° 40 'N LONG : 76 ° 00 'W	

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 11:05M CARGO ☐ BUBBLER ON ☐
AFT: 10:29M BALLAST ☒ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	30	300	Consolidated pack ice Multiyear pieces
ICE COVER 1Y / 2Y+MY / TOT	TENTHS		*	10		
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:

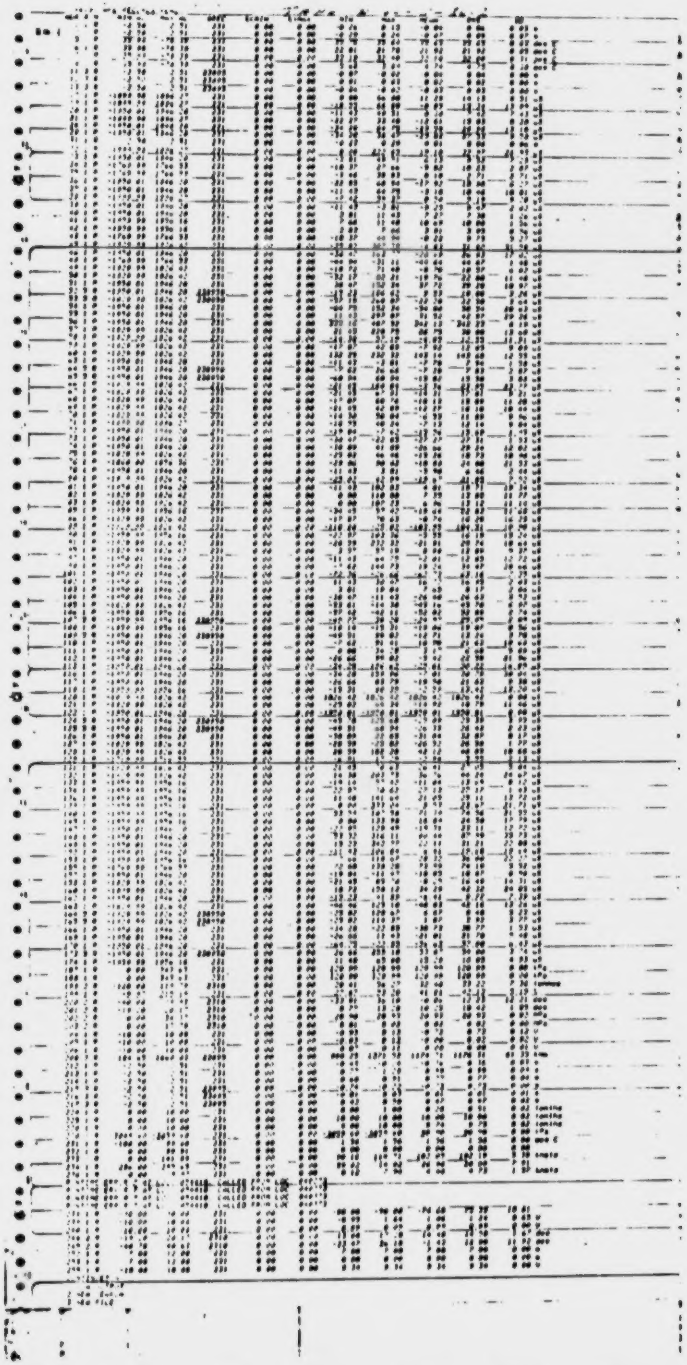
RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT

PHOTOS =
TO

COMMENTS



VOYAGE RECORDS

INDEX Nº 80-5-17.1
YR. - VOYAGE - TAPE FILE

DATE 25th October 1980 RECORDING TIME 15:16 TO 17:37 GMT
ELAPSED TIME 2 H 21 M S

CONTRACTOR : Fenco Consultants Ltd. FINAL REPORT Nº 3202 TP

LOCATION Entrance to Pond Inlet LAT : 72 ° 40 'N LONG : 76 ° 00 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 11.05 M CARGO ☐ BUBBLER ON ☐ ERPM = 360 - 400
AFT: 10.29 M BALLAST ☒ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	2	200	Consolidated pack ice
ICE COVER 1Y 2Y+MY TOT	TENTHS		*	10		Multiyear pieces
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

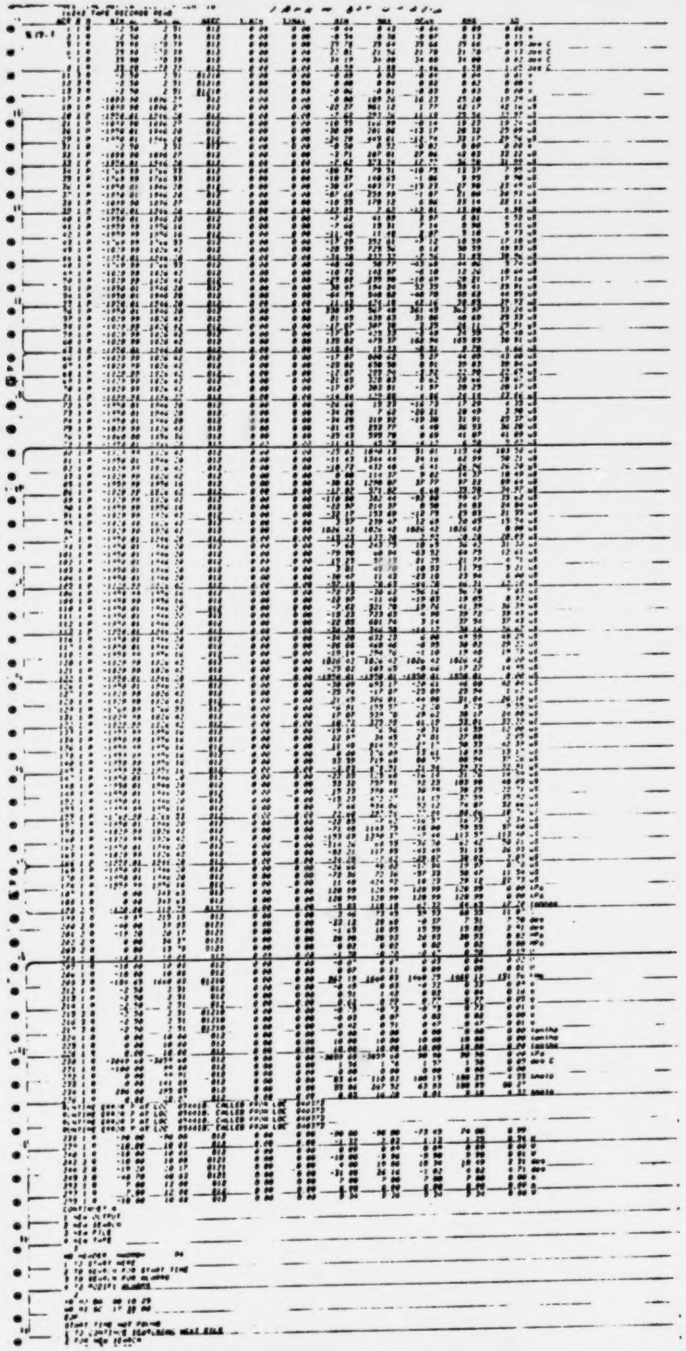
ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:

RECORDING NOTES
MODE RECORDING ☒
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING 80-V2 TAPE Nº:
TIME : 15:27 TO 17:37 GMT
PHOTOS = 6
# F19 TO F24

COMMENTS



VOYAGE RECORDS

INDEX Nº 80-5-17.2
YR. – VOYAGE – TAPE FILE

DATE 25th October 1980 RECORDING TIME 17:38 TO 17:48 GMT
ELAPSED TIME 0 H 10 M S

CONTRACTOR: Fenco Consultants Ltd. FINAL REPORT Nº 3202 TP

LOCATION Entrance to Pond Inlet LAT: 72 ° 40 'N LONG: 76 ° 00 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 11.05 M AFT: 10.29 M
CARGO ☐ BALLAST ☒
BUBBLER ON ☐ OFF ☒
ERPM = 410

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE				COMMENTS
ICE THICKNESS	CM		*	15	15			First year ice
ICE COVER 1Y 2Y+MY TOT	TENTHS		*	10	10			
SNOW COVER	CM							
FLEXURAL STRENGTH	KPa							
COMPRESSIVE STRENGTH	MPa							
FRICTION								
PRESSURE	MPa							
RIDGES								
CRYSTAL								
SALINITY	%							

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

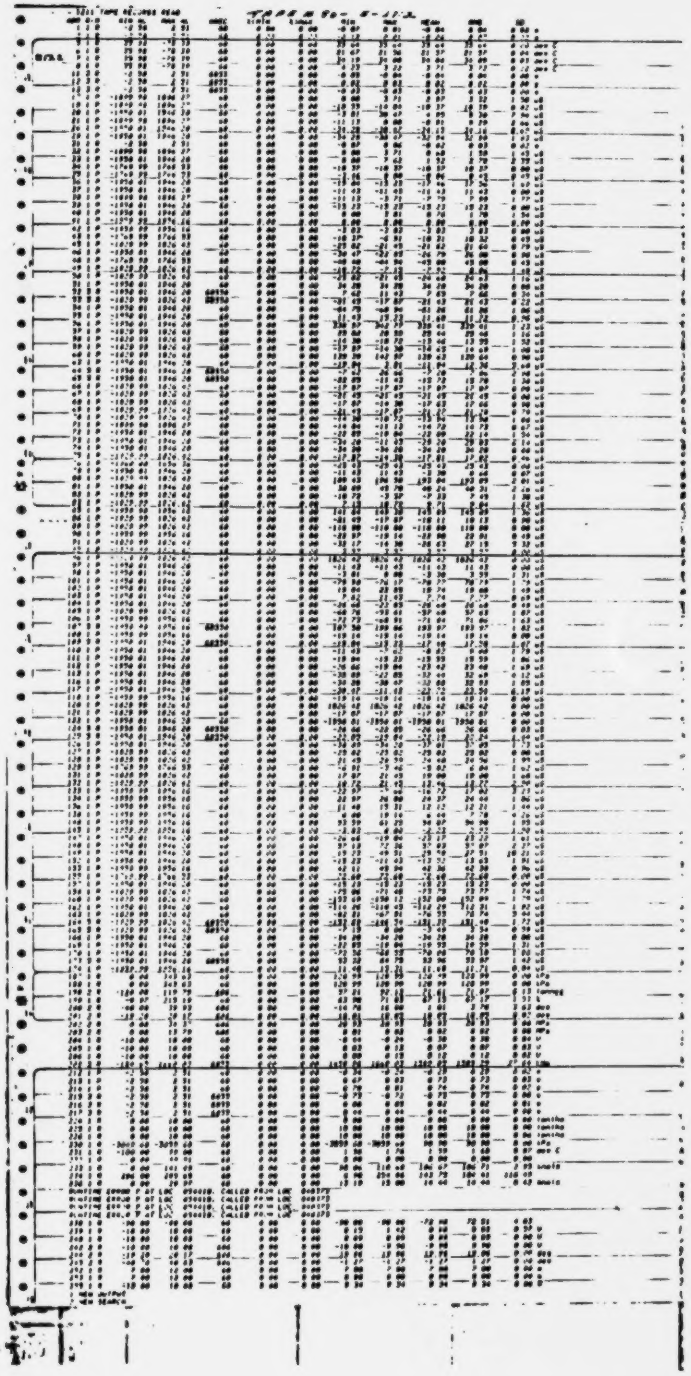
RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING 80-V3 TAPE Nº: PHOTOS =
TIME: 17:38 TO 17:48 GMT # TO

COMMENTS



VOYAGE RECORDS

INDEX Nº 80-5-17.3
YR. – VOYAGE – TAPE FILE

DATE 25th October 1980
RECORDING TIME 17:49 TO 19:10 GMT
ELAPSED TIME 1 H 21 M S

CONTRACTOR : Fenco Consultants Ltd.
FINAL REPORT Nº 3202 TP

LOCATION Entrance to Pond Inlet
LAT : 72 ° 40 'N
LONG : 76 ° 00 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 11.05 M
AFT: 10.29 M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐ OFF ☒
ERPM = 410

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
				1Y		2Y+MY		TOT		
ICE THICKNESS	CM		*	3		3	20		20	
ICE COVER	TENTHS		*	9	0	9	10	0	10	New ice
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

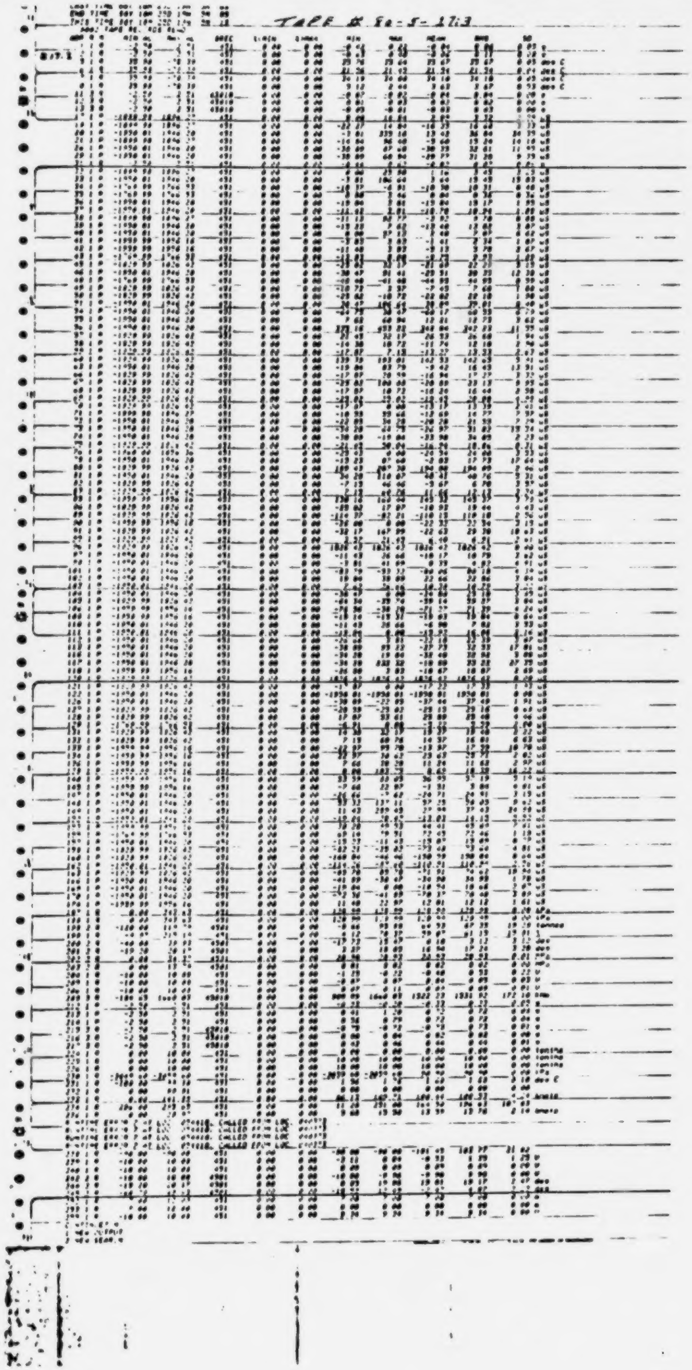
ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:

RECORDING NOTES
MODE RECORDING ☒
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING 80-V3 TAPE Nº:
TIME : 17:49 TO 19:10 GMT
PHOTOS =
TO

COMMENTS


TAPE # 80-5-17.3

VOYAGE RECORDS

INDEX Nº 80-6-18.1
YR.-VOYAGE-TAPE FILE

DATE 3rd November 1980
RECORDING TIME 14:08 TO 16:10 GMT
ELAPSED TIME 2 H 2 M S

CONTRACTOR : Fenco Consultants Ltd.
FINAL REPORT Nº 3202 TP

LOCATION Baffin Bay
LAT : 72 ° 30 'N
LONG : 75 ° 00 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				
ICE COVER 1Y / 2Y+MY / TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

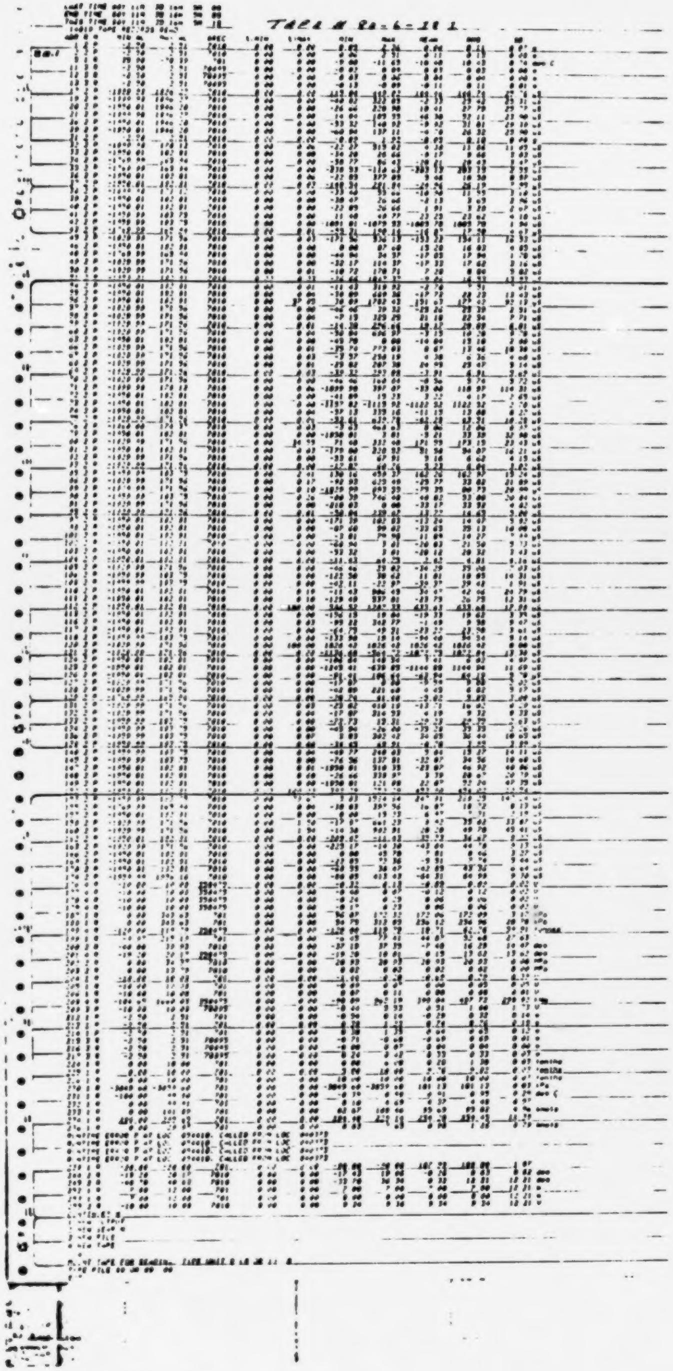
ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☒
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS Recorded continuously due to S/G offset


TAPE # 80-6-18.1

VOYAGE RECORDS

INDEX Nº
80-6-19.1
YR.-VOYAGE-TAPE FILE

DATE 3rd November 1980 RECORDING TIME 16:19 TO 18:18 GMT
ELAPSED TIME 1 H 59 M S

CONTRACTOR : Fenco Consultants Ltd. FINAL REPORT Nº 3202 TP

LOCATION Baffin Bay LAT : 72 ° 30 'N
LONG : 74 ° 00 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.7 M CARGO ☐ BUBBLER ON ☐
AFT: M BALLAST ☒ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				
ICE COVER 1Y 2Y+MY TOT	TENTHS		*	10	Multiyear pack ice
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

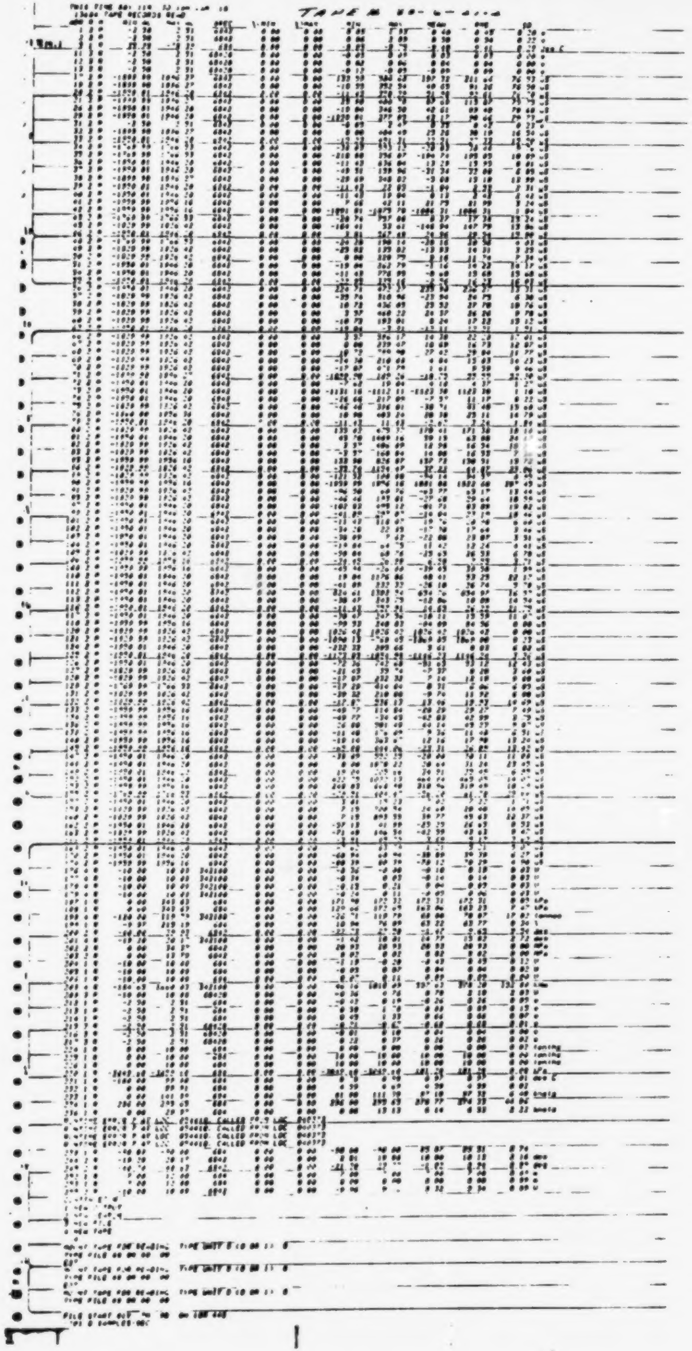
RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: PHOTOS =
TIME : TO GMT # TO

COMMENTS



VOYAGE RECORDS

INDEX Nº 80-6-20.1
YR. – VOYAGE – TAPE FILE

DATE 6th November 1980
RECORDING TIME 19:07 TO 23:07 GMT
ELAPSED TIME 4 H 0 M S

CONTRACTOR : Fenco Consultants Ltd.
FINAL REPORT Nº 3202 TP

LOCATION Davis Strait
LAT : 67 ° 00 'N
LONG : 60 ° 00 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.7 M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				Open water Force 10 winds
ICE COVER 1Y 2Y+MY TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				*
RAMMING				
ASTERN				
TURNING				

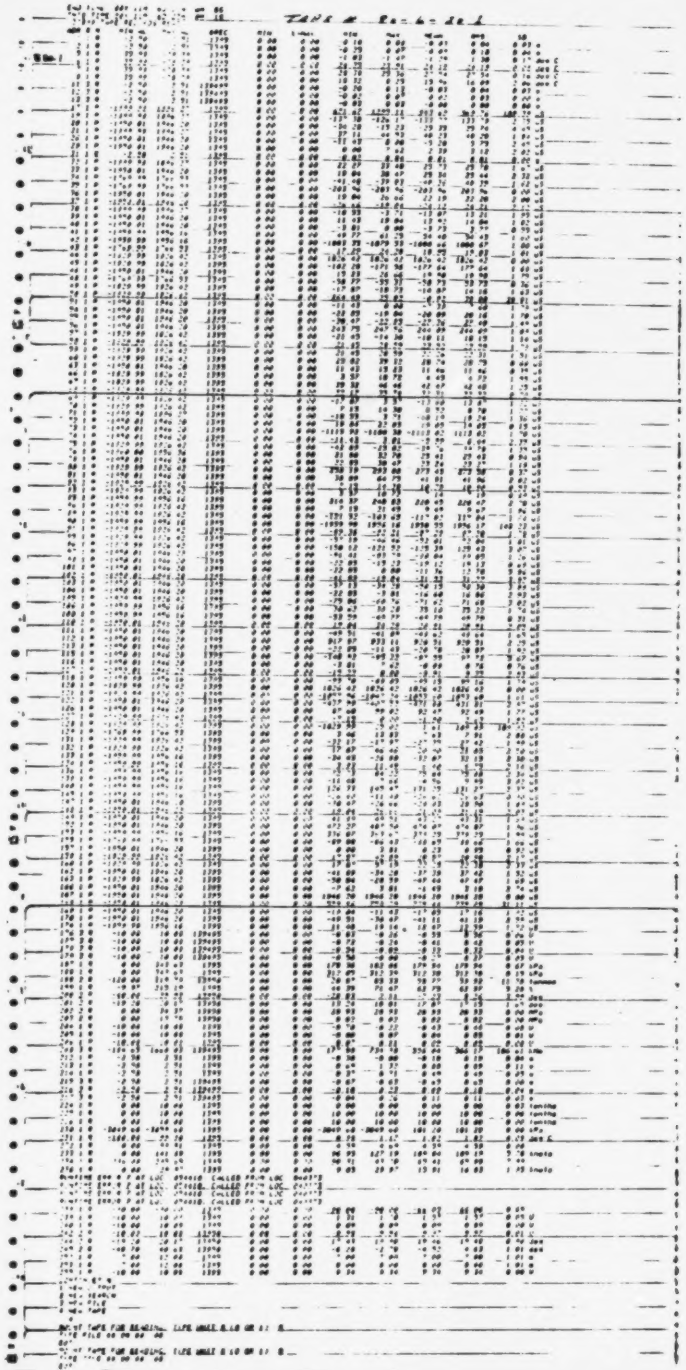
ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:

RECORDING NOTES
MODE RECORDING ☒
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS: (SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS



VOYAGE RECORDS

INDEX Nº 80-6-21.1
YR.-VOYAGE-TAPE FILE

DATE 9th November 1980
RECORDING TIME 13:37 TO 15:37 GMT
ELAPSED TIME 2 H 0 M S

CONTRACTOR : Fenco Consultants Ltd.
FINAL REPORT Nº 3202 TP

LOCATION Hudson Bay
LAT : 59 ° 00 'N
LONG : 94 ° 00 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 10.7 M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE			COMMENTS
ICE THICKNESS	CM						
ICE COVER IY 2Y+MY TOT	TENTHS		*	10	0	10	Consolidated pack ice
SNOW COVER	CM						
FLEXURAL STRENGTH	KPa						
COMPRESSIVE STRENGTH	MPa						
FRICTION							
PRESSURE	MPa						
RIDGES							
CRYSTAL							
SALINITY	%						

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

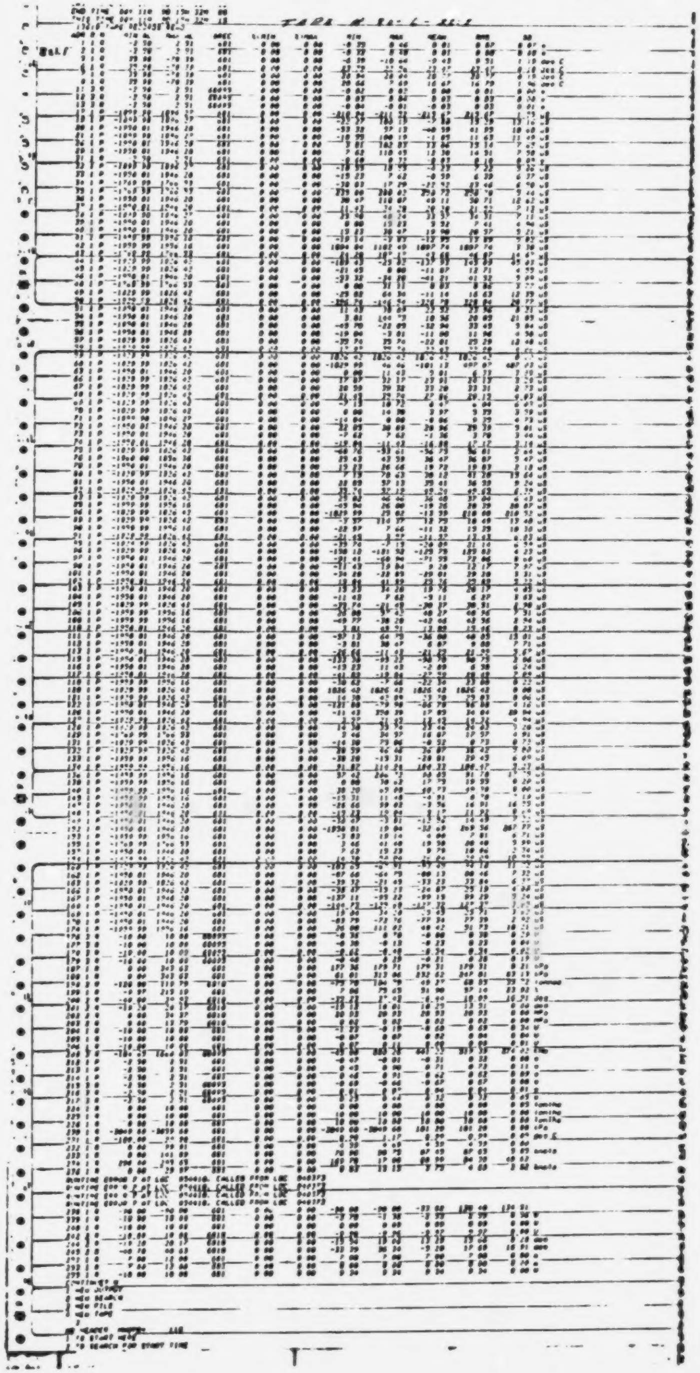
ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS



VOYAGE RECORDS

INDEX Nº 80-6-21.2
YR. - VOYAGE - TAPE FILE

DATE 9th November 1980

RECORDING TIME 20:37 TO GMT

ELAPSED TIME H M S

CONTRACTOR : Fenco Consultants Ltd.

FINAL REPORT Nº 3202 TP

LOCATION Hudson Bay

LAT : 59 ° 00 'N

LONG : 94 ° 00 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: 10.7 M

AFT: M

CARGO ☐

BALLAST ☒

BUBBLER ON ☐

OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM									
ICE COVER 1Y | 2Y+MY | TOT	TENTHS		*	10	0	10				Consolidated pack ice
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐

NAME

FOLLOWING ☐

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN:

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐

INTERVAL= SECS

TAPE INFO HEADER ☐

EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

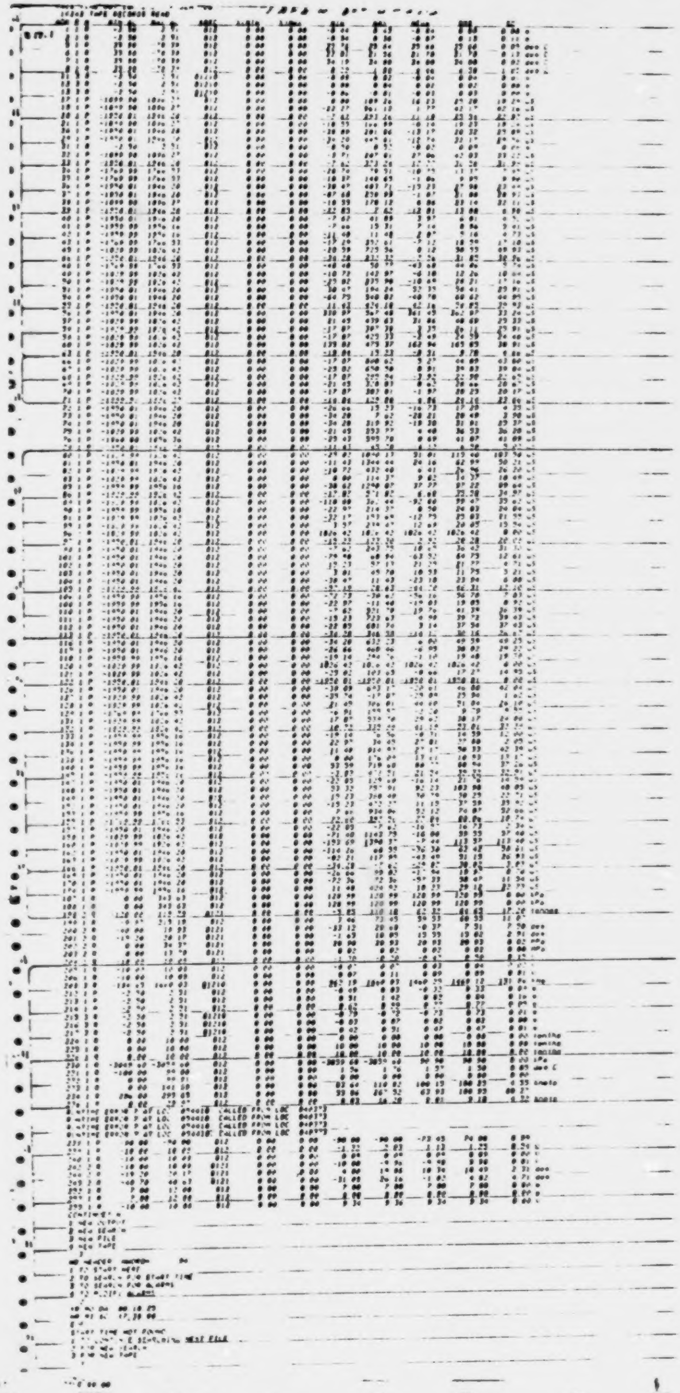
VIDEO RECORDING TAPE Nº:

TIME : TO GMT

PHOTOS =

TO

COMMENTS



2.4 ARCTIC RECORDING SEASON - 1981

2.4 ARCTIC RECORDING SEASON - 1981

The Data Acquisition System was operated by two contractors during the Arctic Recording Season 1981. Fenco Consultants Ltd. were responsible for the early season while Arctec Canada Ltd. operated the system in the latter part. German & Milne Inc. were responsible for maintenance of the system for the duration of the Season.

A summary of the 1981 Season Voyages is shown in figure 2.14. Sampling rates used in this season are as shown below.

SAMPLING RATES

R - Real
P - Peak

Rate 0 - Sensor not sampled
Rate 1 - 1 sample/10 seconds
Rate 2 - 1 sample/second
Rate 3 - 10 samples/second
Rate 4 - 50 samples/second
Rate 5 - 100 samples/second
Rate 6 - 500 samples/second
Rate 7 - 1000 samples/second

2.4.1 EARLY ARCTIC RECORDING SEASON - 1981

In the early season operated by Fenco Consultants Ltd. the M.V. ARCTIC made 2-1/2 round trips to Nanisivik (26th June 1981 to 27th August 1981) during which 11 tapes were recorded. Except for the first voyage to Nanisivik NWT, ice conditions were exceptionally light and no tapes were recorded on the remainder of that half of the season.

SUMMARY OF 1981 SEASON VOYAGES

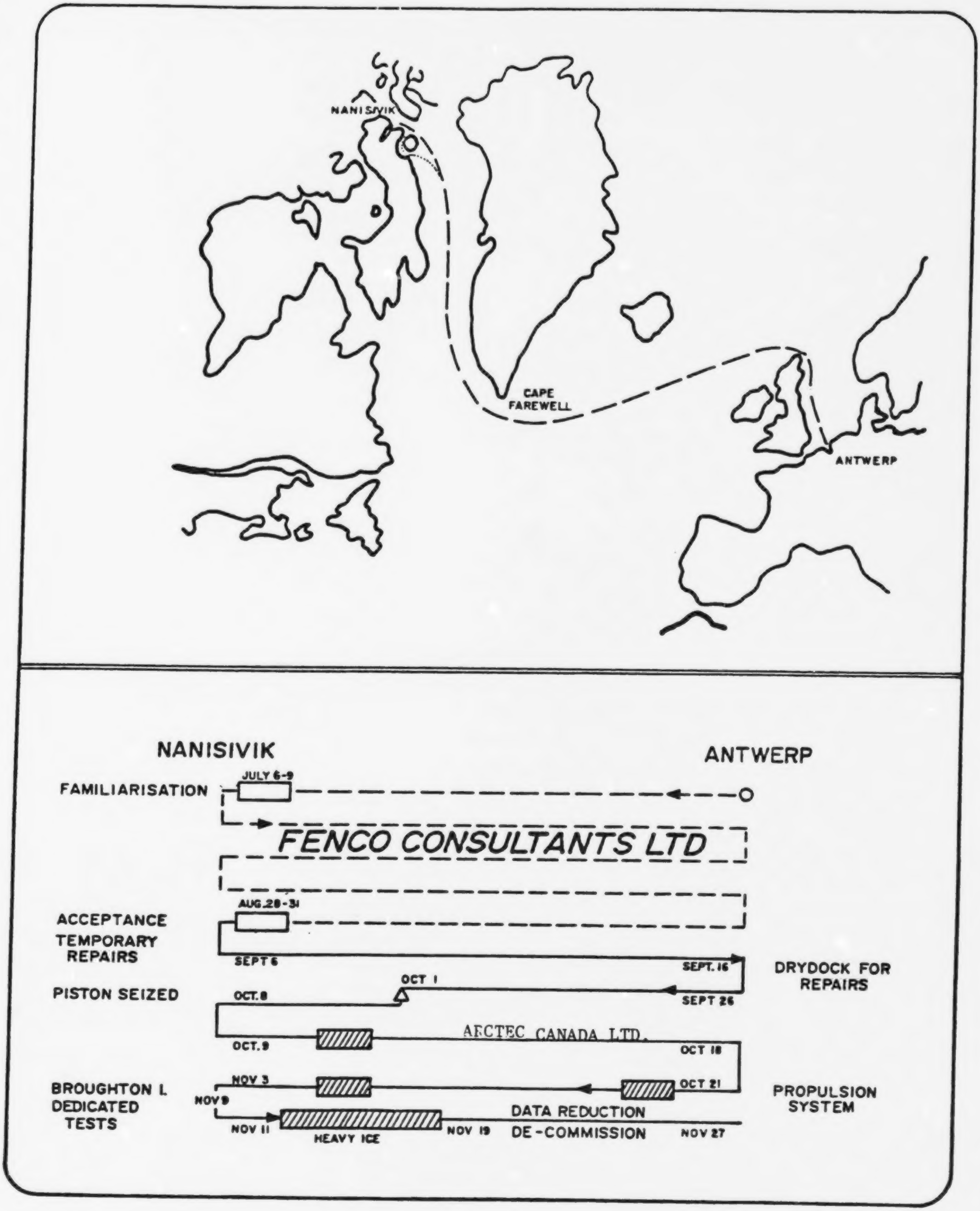
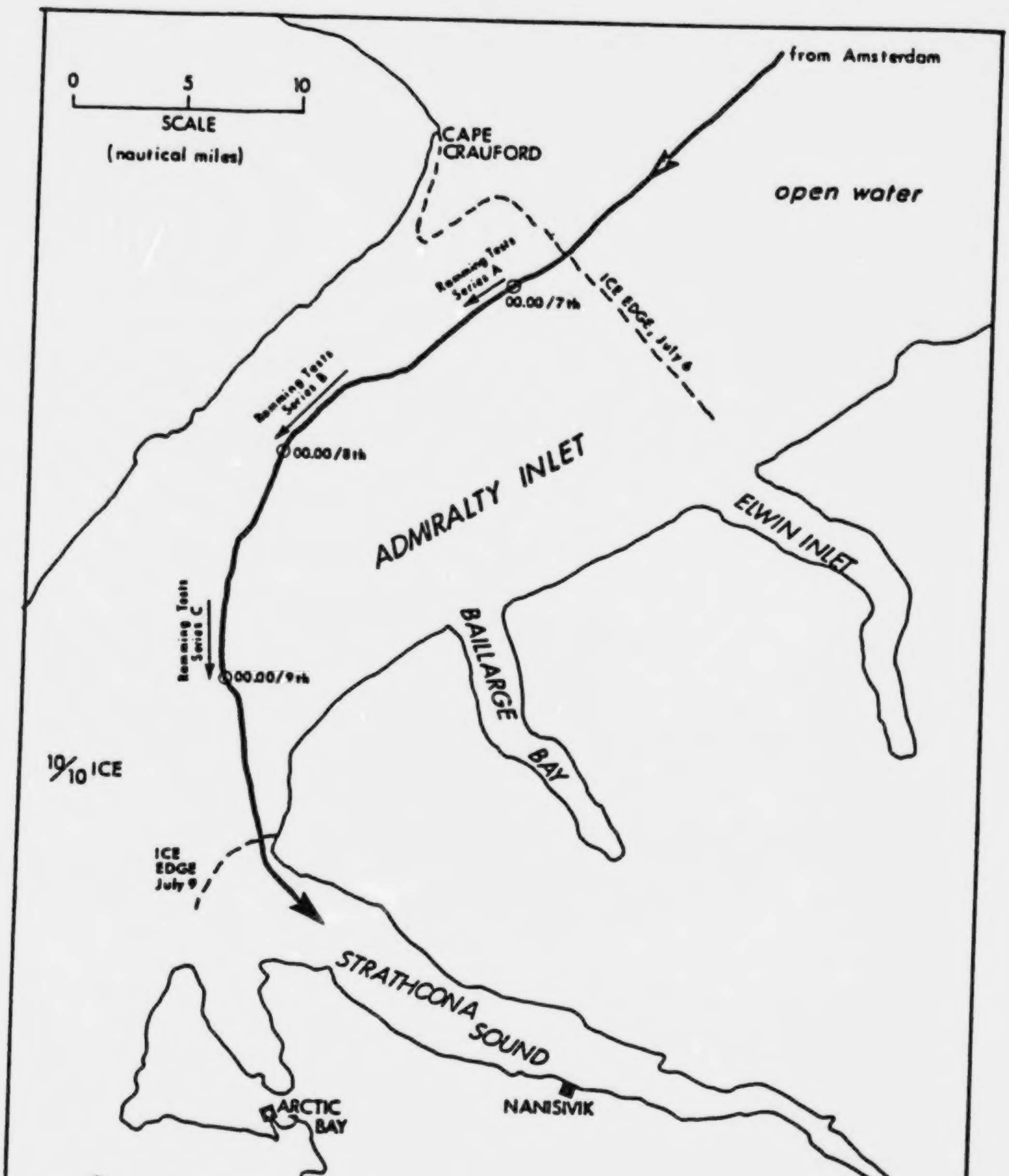

NANISIVIK
CAPE FAREWELL
ANTWERP
NANISIVIK
ANTWERP
FAMILIARISATION
JULY 6-9
FENCO CONSULTANTS LTD
ACCEPTANCE
TEMPORARY REPAIRS
AUG.28-31
SEPT 6
SEPT. 16
DRYDOCK FOR REPAIRS
PISTON SEIZED
OCT. 8
OCT 1
SEPT 26
OCT. 9
ARCTEC CANADA LTD.
OCT 18
BROUGHTON I. DEDICATED TESTS
NOV 3
OCT 21
PROPULSION SYSTEM
NOV 9
DATA REDUCTION
NOV 11
HEAVY ICE
NOV 19
DE-COMMISSION
NOV 27

Figure 2.14

VOYAGE LOG

Early Arctic Season 1981

Voyage No.	Origin - Destination (Dates)	Tape Numbers (number of files)	Video Tape No.	Dates in Ice (total time)	Recording Time (hr:min:sec)	
					in ice	total
81-1	Amsterdam - Nanisivik (26 June - 9 July)	1(1), 7(13), 8(2)		5 July - 9 July		5:30:42
81-2	Nanisivik - Antwerp (12 July -	9(6), 10(1), 11(2)		12 July		2:48:59
81-3	Antwerp - Nanisivik					
81-4	Nanisivik - Antwerp					
81-5	Antwerp - Nanisivik (- Aug 27)					
				TOTAL (hrs:mins:secs)		8:19:41


0 5 10
SCALE
(nautical miles)
from Amsterdam
CAPE CRAUFORD
open water
Ramming Tests Series A
00.00/7th
ICE EDGE, July 6
Ramming Tests Series B
00.00/8th
ADMIRALTY INLET
ELWIN INLET
Ramming Tests Series C
00.00/9th
BAILLARGE BAY
10/10 ICE
ICE EDGE July 9
STRATHCONA SOUND
ARCTIC BAY
NANISIVIK

Ship's route during ramming tests, July, 1981
Positions and times (GMT) taken from ship's log.

Figure 2.15

VOYAGE RECORDS

INDEX Nº
81-1-1.1
YR. – VOYAGE – TAPE FILE

DATE July 5th, 1981

RECORDING TIME 17:28:14 TO 20:51:39 GMT

ELAPSED TIME 3 H 23 M 25 S

CONTRACTOR : Fenco Consultants Ltd.

FINAL REPORT Nº 3632 TP

LOCATION Lancaster Sound

LAT : ° 'N

LONG : ° 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M

AFT: M

CARGO ☐

BALLAST ☒

BUBBLER ON ☐

OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				Pack ice
ICE COVER 1Y 2Y+MY TOT	TENTHS		*	1	Ship speed 5 knots
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐

NAME

FOLLOWING ☐

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE 1. To examine structural response during ice navigation

REASON FOR SAMPLING PATTERN: 1. To collect a broad range of data for possible subsequent analysis.

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐

INTERVAL= SECS

TAPE INFO HEADER ☐

EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

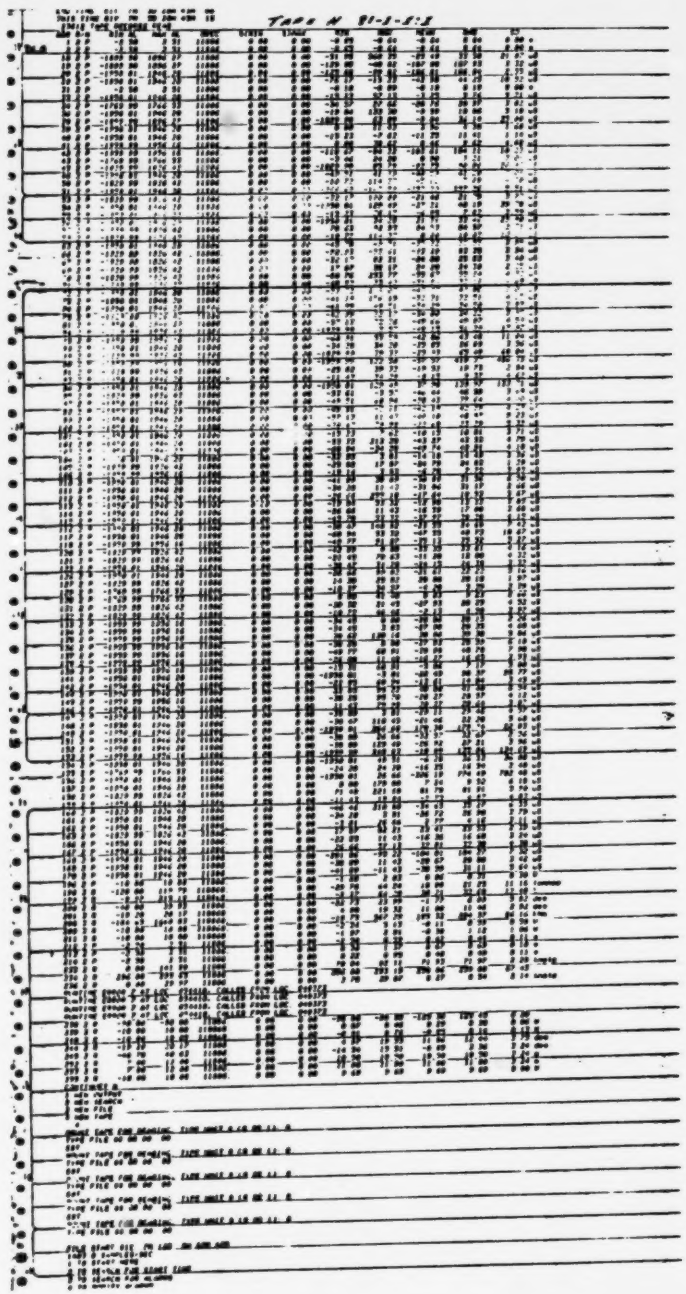
VIDEO RECORDING TAPE Nº:

TIME : TO GMT

PHOTOS =

# TO

COMMENTS General sampling pattern (See Appendix A)



VOYAGE RECORDS

INDEX Nº 81-1-7.1
YR.-VOYAGE-TAPE FILE

DATE July 8th, 1981
RECORDING TIME 22:36:40 TO GMT
ELAPSED TIME H M S

CONTRACTOR : Fenco Consultants Ltd.
FINAL REPORT Nº 3632 TP

LOCATION Admiralty Inlet
LAT : ° 'N
LONG : ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M AFT: M
CARGO ☐ BALLAST ☒
BUBBLER ON ☐ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	153	Level ice
ICE COVER 1Y 2Y+MY TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

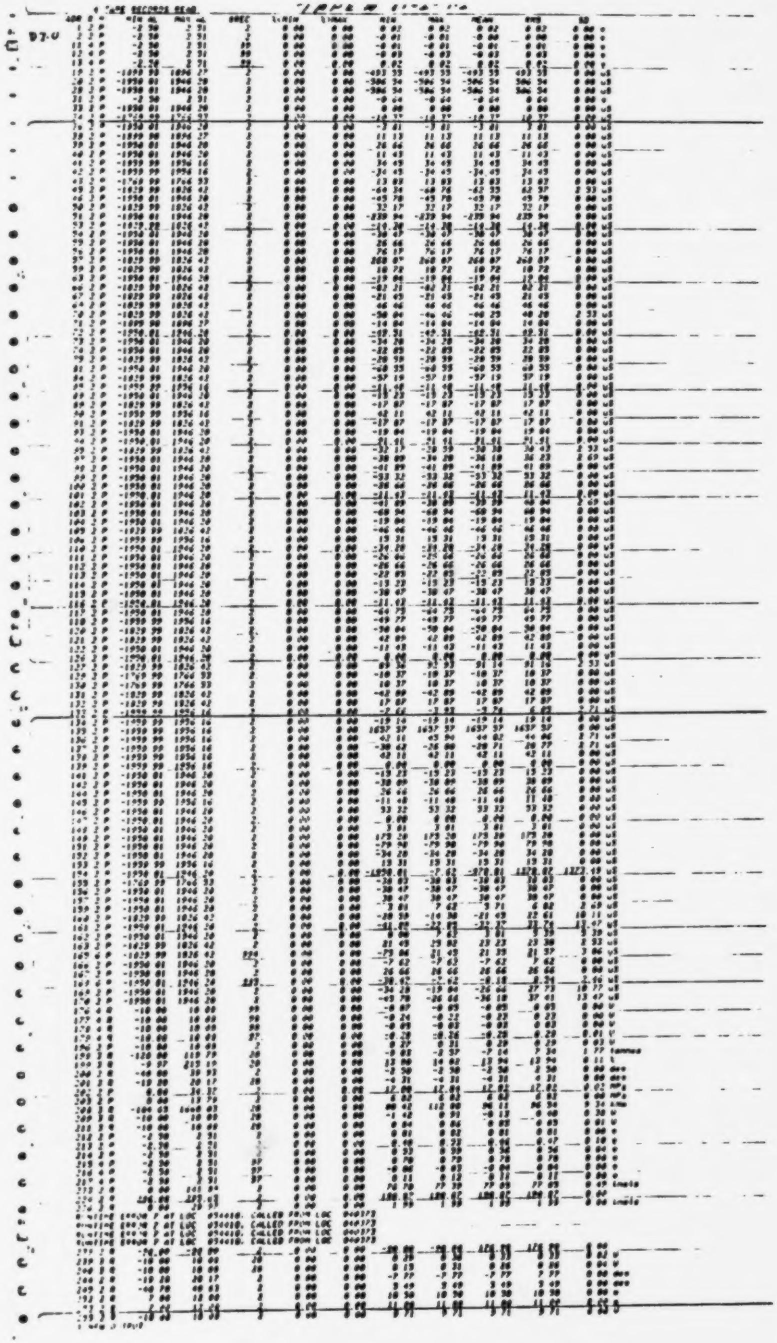
ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE 1. To determine structural response while ramming
REASON FOR SAMPLING PATTERN: 1. To collect a broad range of data for possible subsequent analysis.

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS General sampling pattern
+ Pattern B + Pattern A-6 (See Appendix A)



VOYAGE RECORDS

INDEX Nº 81-1-7.2
YR.-VOYAGE-TAPE FILE

DATE July 8th, 1981

RECORDING TIME 22:36:52 TO GMT

ELAPSED TIME H M S

CONTRACTOR : Fenco Consultants Ltd.

FINAL REPORT Nº 3632 TP

LOCATION Admiralty Inlet

LAT : ° 'N

LONG : ° 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M

AFT: M

CARGO ☐

BALLAST ☑

BUBBLER ON ☐

OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	153	Level ice
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐

NAME

FOLLOWING ☐

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE 1. To determine structural response while ramming.

REASON FOR SAMPLING PATTERN: 1. To collect a broad range of data for possible subsequent analysis.

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐

INTERVAL= SECS

TAPE INFO HEADER ☐

EOF ☐

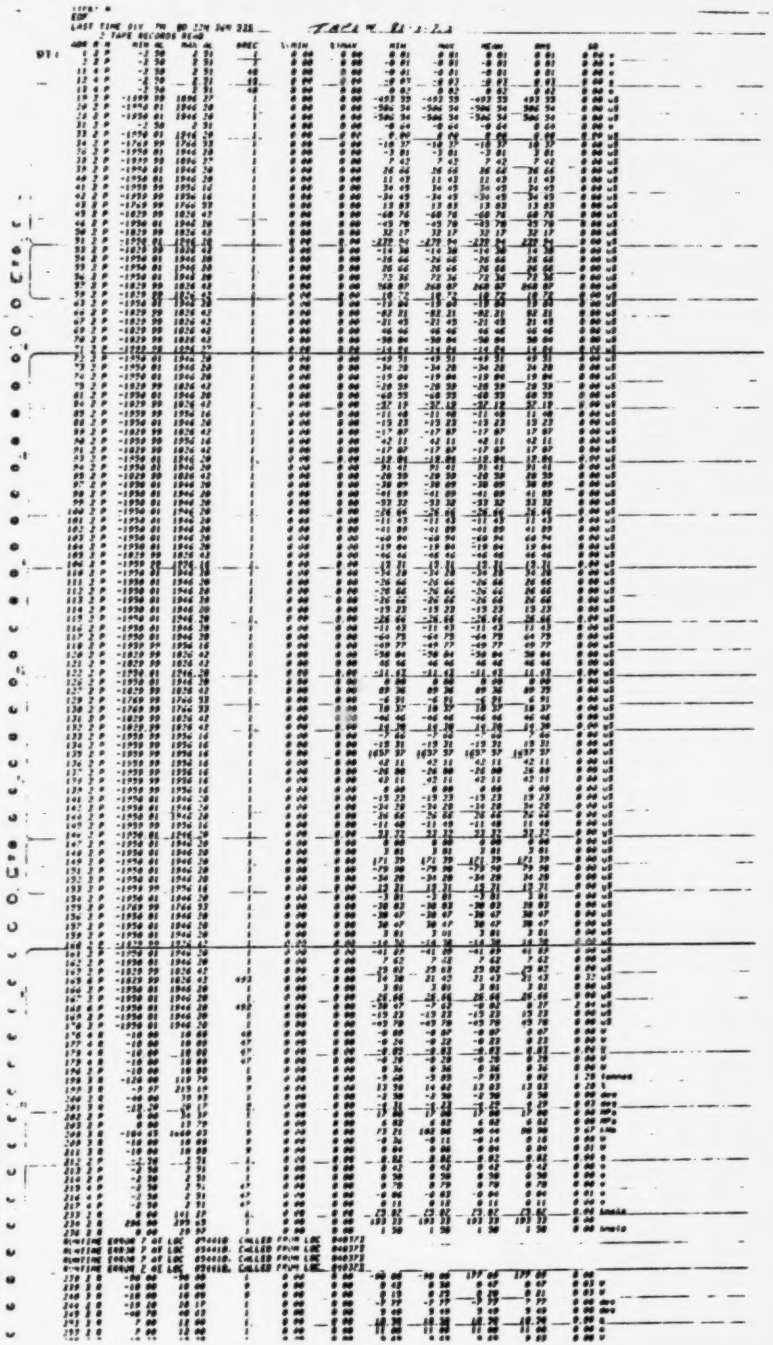
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:

TIME : TO GMT

PHOTOS =
TO

COMMENTS General sampling pattern
+ Pattern B + Pattern A-6 (See Appendix A)



VOYAGE RECORDS

INDEX Nº 81-1-7.3
YR.-VOYAGE-TAPE FILE

DATE July 8th, 1981

RECORDING TIME 22:37:08 TO 22:37:58 GMT

ELAPSED TIME 00 H 00 M 50 S

CONTRACTOR: Fenco Consultants Ltd.

FINAL REPORT Nº 3632 TP

LOCATION Admiralty Inlet

LAT: ° 'N

LONG: ° 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M CARGO ☐ BUBBLER ON ☐

AFT: M BALLAST ☒ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	153	Level ice
ICE COVER 1Y 2Y+MY TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐

NAME

FOLLOWING ☐

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE 1. To determine structural response while ramming.

REASON FOR SAMPLING PATTERN: 1. To collect a broad range of data for possible subsequent analysis.

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐ INTERVAL= SECS

TAPE INFO HEADER ☐ EOF ☐

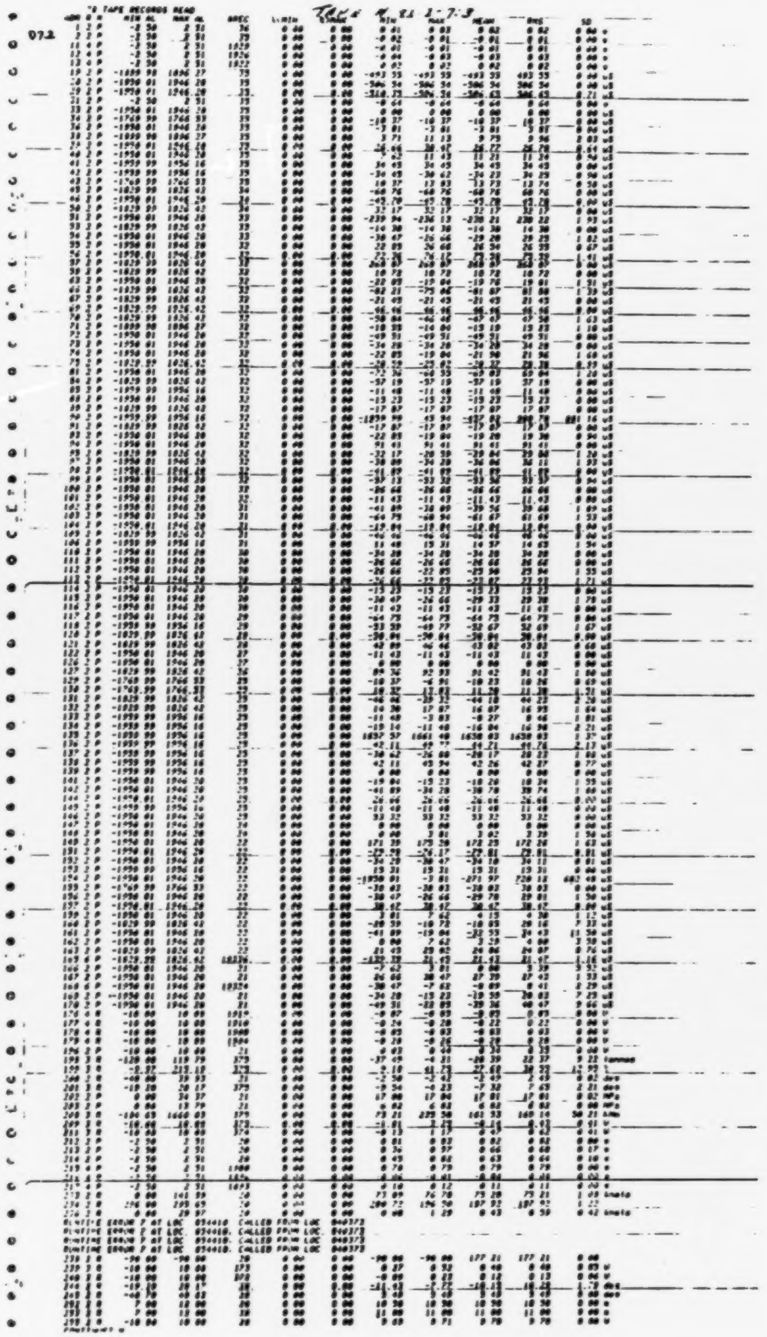
OMIT CHANNELS: (SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:

TIME: TO GMT

PHOTOS = # TO

COMMENTS General sampling pattern
+ Pattern A-6 + Pattern B (See Appendix B)



Tape # 81 1-7.3

VOYAGE RECORDS

INDEX Nº 81-1- 7.4
YR.—VOYAGE—TAPE FILE

DATE July 8th, 1981

RECORDING TIME 22:38:24 TO 22:44:00 GMT
ELAPSED TIME 00 H 05 M 36 S

CONTRACTOR : Fenco Consultants Ltd.

FINAL REPORT Nº 3632 TP

LOCATION Admiralty Inlet

LAT : ° 'N
LONG : ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	153	Level ice
ICE COVER IY 2Y+MY TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE 1. To determine structural response while ramming.

REASON FOR SAMPLING PATTERN: 1. To collect a broad range of data for possible subsequent analysis.

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☐
TAPE INFO HEADER ☐
INTERVAL= SECS
EOF ☐
OMIT CHANNELS: (SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT

PHOTOS =
TO

COMMENTS
General sampling pattern
+ Pattern B + Pattern A-6 (See Appendix A)
S/G Removed from Pattern B

NO PRINTOUT AVAILABLE

VOYAGE RECORDS

INDEX Nº 81-1-7.5
YR.-VOYAGE-TAPE FILE

DATE July 8th, 1981
RECORDING TIME 22:44:52 TO GMT
ELAPSED TIME H M S

CONTRACTOR : Fenco Consultants Ltd.
FINAL REPORT Nº 3632 TP

LOCATION Admiralty Inlet
LAT : ° 'N
LONG : ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	153	Level ice
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE 1. To determine structural response while ramming.

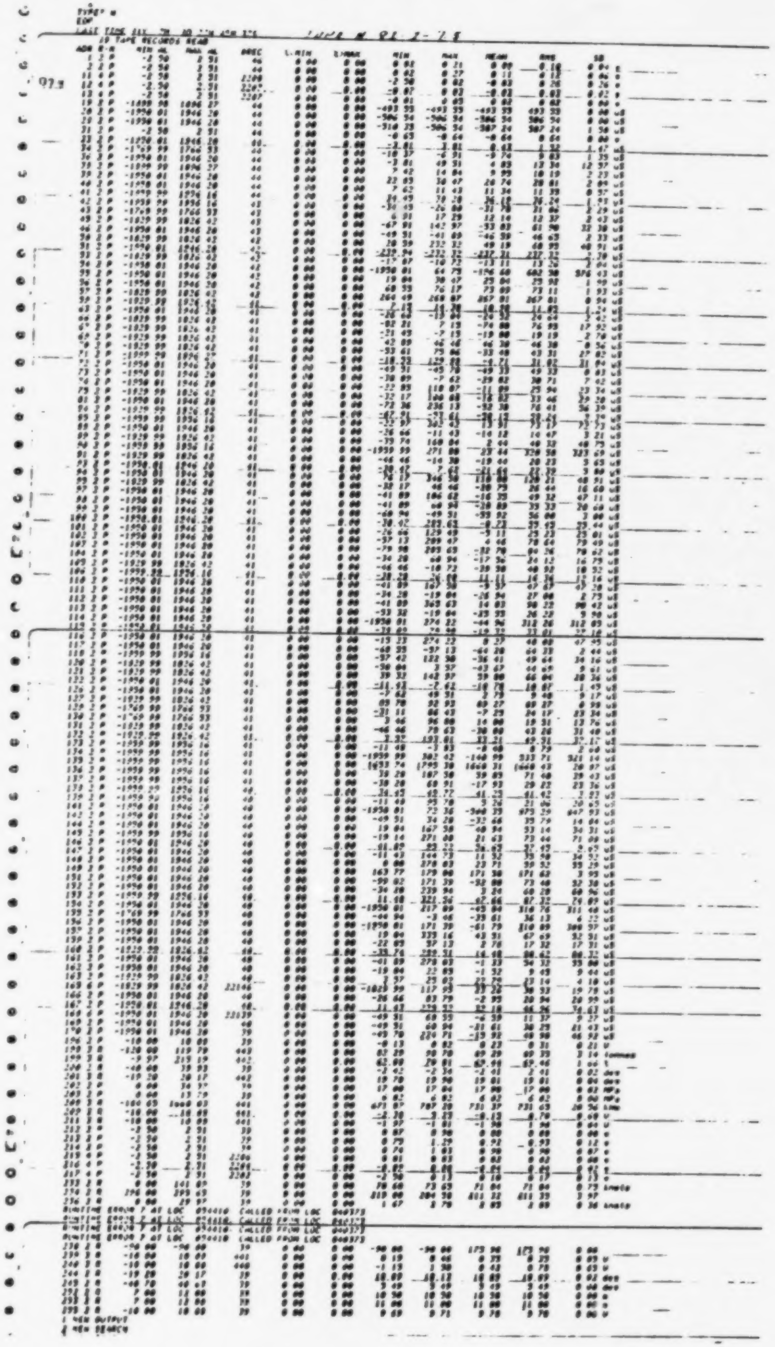
REASON FOR SAMPLING PATTERN: 1. To collect a broad range of data for possible subsequent analysis.

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☐
TAPE INFO HEADER ☐
INTERVAL= SECS
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS General sampling pattern
+ Pattern B + Pattern A-6 (See Appendix A)
S/G Removed from Pattern B



VOYAGE RECORDS

INDEX Nº 81-1-7.6
YR.-VOYAGE-TAPE FILE

DATE July 8th, 1981

RECORDING TIME 22:56:20 TO 23:12:01 GMT

ELAPSED TIME 00 H 15 M 41 S

CONTRACTOR : Fenco Consultants Ltd.

FINAL REPORT Nº 3632 TP

LOCATION Admiralty Inlet

LAT : ° 'N

LONG : ° 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M

AFT: M

CARGO ☐

BALLAST ☒

BUBBLER ON ☐

OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	153	Level ice
ICE COVER (IY / 2Y+MY / TOT)	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐

NAME

FOLLOWING ☐

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE 1. To determine structural response while ramming.

REASON FOR SAMPLING PATTERN: 1. To collect a broad range of data for possible subsequent analysis

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐

INTERVAL= SECS

TAPE INFO HEADER ☐

EOF ☐

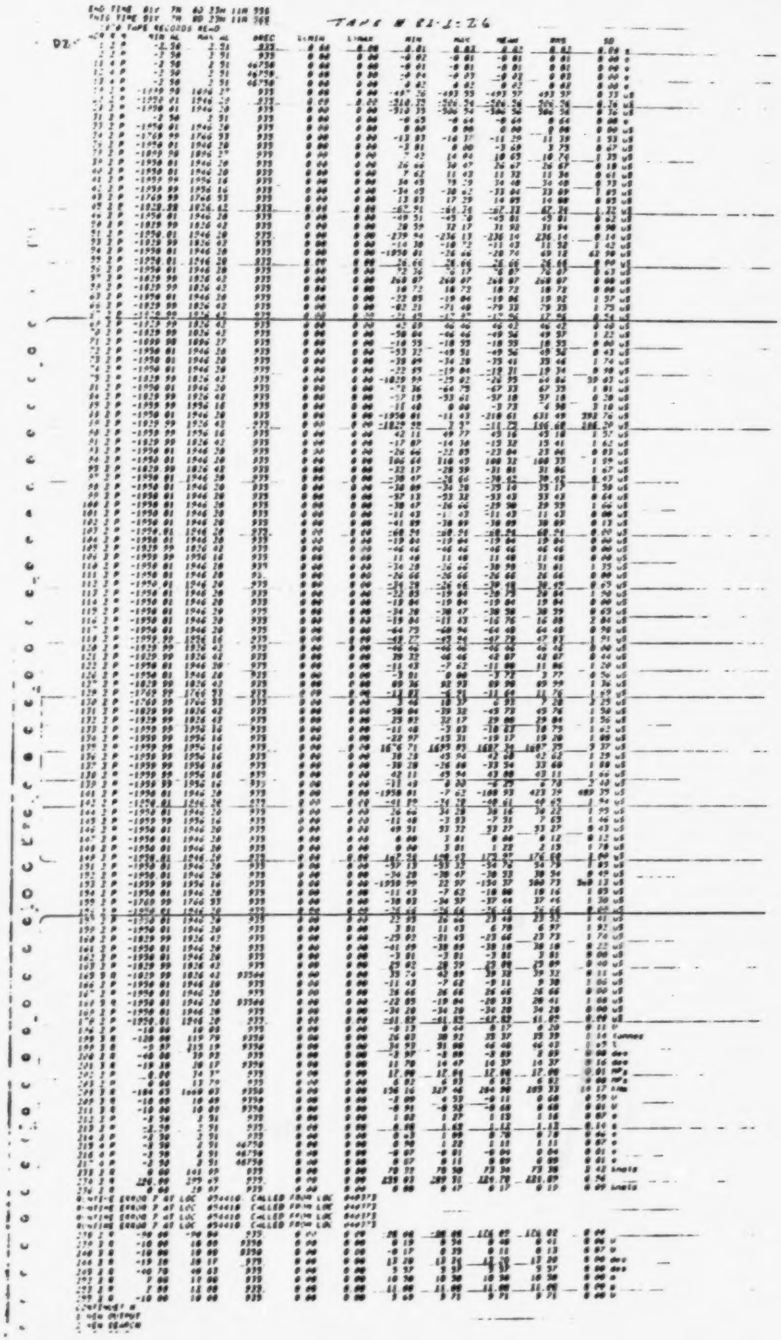
OMIT CHANNELS: (SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:

TIME : TO GMT

PHOTOS = # TO

COMMENTS General sampling pattern
+ Pattern B + Pattern A-6 (See Appendix A)
S/G Removed from Pattern B



TAPE # 81-1:7.6

VOYAGE RECORDS

INDEX Nº 81-1-7.7
YR.-VOYAGE-TAPE FILE

DATE July 8th, 1981

RECORDING TIME 23:13:30 TO 23:18:57 GMT

ELAPSED TIME 00 H 05 M 27 S

CONTRACTOR: Fenco Consultants Ltd.

FINAL REPORT Nº 3632 TP

LOCATION Admiralty Inlet

LAT: ° 'N

LONG: ° 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M CARGO ☐ BUBBLER ON ☐

AFT: M BALLAST ☒ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	153	Level ice
ICE COVER 1Y | 2Y+MY | TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐

NAME

FOLLOWING ☐

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE 1. To determine structural response while ramming.

REASON FOR SAMPLING PATTERN: 1. To collect a broad range of data for possible subsequent analysis.

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐ INTERVAL= SECS

TAPE INFO HEADER ☐ EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

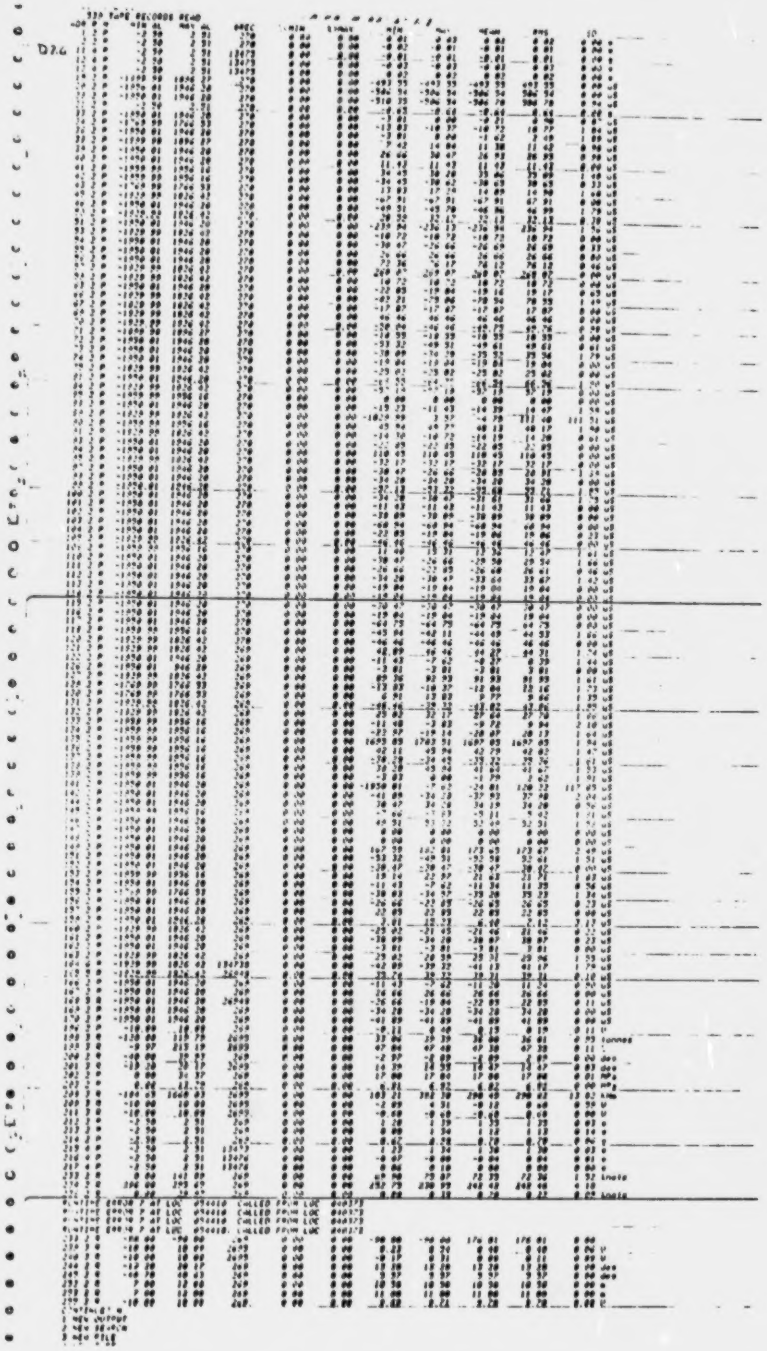
VIDEO RECORDING TAPE Nº:

TIME: TO GMT

PHOTOS =

TO

COMMENTS General sampling pattern
+ special pattern B + special pattern A-6
+ chs 165 & 168 at 100 s/sec.
S/G removed from Pattern B



VOYAGE RECORDS

INDEX Nº 81-1-7.8
YR.-VOYAGE-TAPE FILE

DATE July 8th, 1981

RECORDING TIME 23:20:30 TO 23:21:00 GMT
ELAPSED TIME 00 H 00 M 30 S

CONTRACTOR : Fenco Consultants Ltd.

FINAL REPORT Nº 3632 TP

LOCATION Admiralty Inlet

LAT : ° 'N
LONG : ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	153	Level ice
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE To determine structural response while ramming.

REASON FOR SAMPLING PATTERN: 1. To collect a broad range of data for possible subsequent analysis.

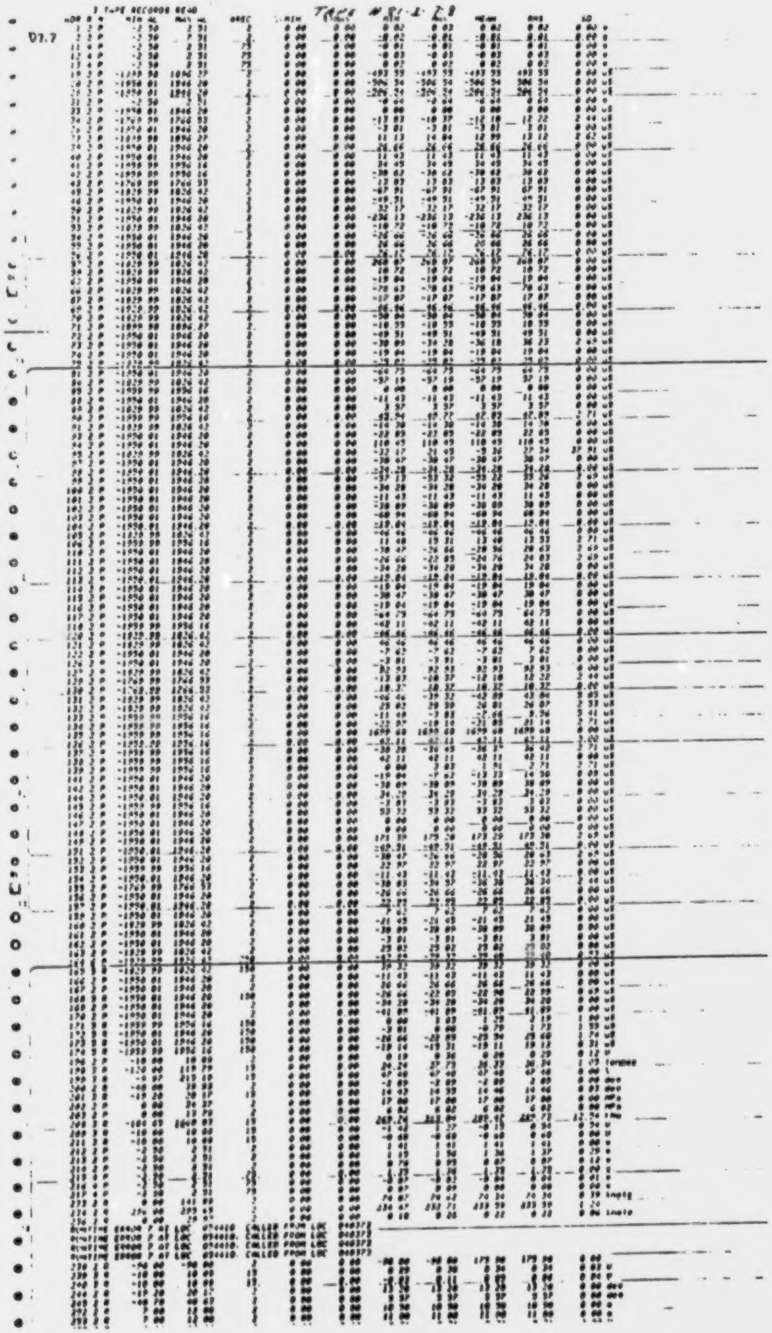
RECORDING NOTES

MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS: (SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT

PHOTOS =
TO

COMMENTS General sampling pattern
+ pattern B + pattern A-6 (See Appendix A)
+ chs 165 & 168 at 100 s/sec
S/G removed from pattern B



TAPE #81-1-7.8

VOYAGE RECORDS

INDEX Nº 81-1-7.9
YR. – VOYAGE – TAPE FILE

DATE July 8th, 1981 RECORDING TIME 23:25:53 TO 23:40:03 GMT
ELAPSED TIME 00 H 14 M 10 S

CONTRACTOR : Fenco Consultants Ltd. FINAL REPORT Nº 3632 TP

LOCATION Admiralty Inlet LAT : ° 'N LONG : ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☐ BUBBLER ON ☐
AFT: M BALLAST ☒ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	153	Level ice
ICE COVER 1Y / 2Y+MY / TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

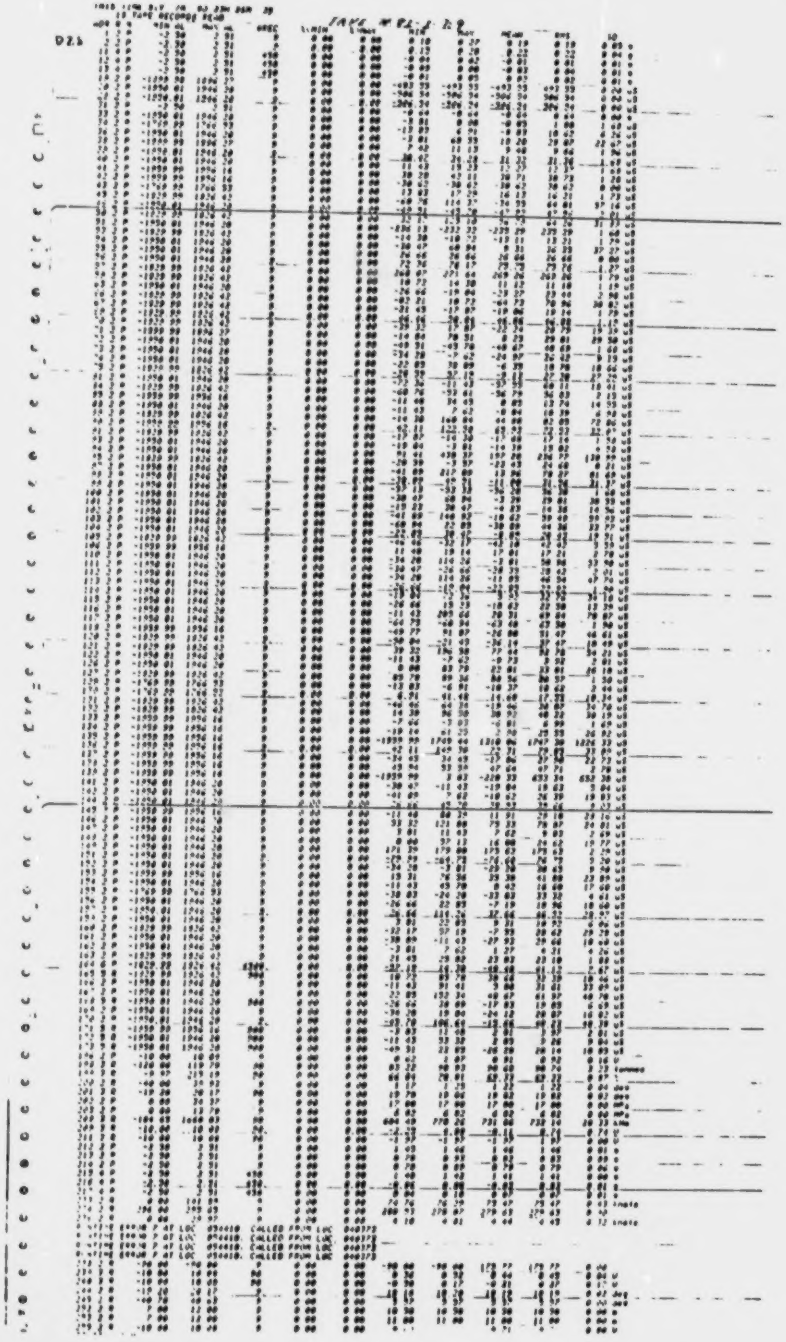
ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE 1. To determine structural response while ramming.
REASON FOR SAMPLING PATTERN: 1. To collect a broad range of data for possible subsequent analysis.

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: PHOTOS =
TIME : TO GMT # TO

COMMENTS
General sampling pattern
+ pattern B + pattern A-6 (See Appendix A)
+ chs 165 & 168 at 100 S/Sec.
S/G removed from pattern B



VOYAGE RECORDS

INDEX Nº 81-1-7.10
YR. – VOYAGE – TAPE FILE

DATE July 8th, 1981
RECORDING TIME 23:41:57 TO GMT
ELAPSED TIME H M S

CONTRACTOR : Fenco Consultants Ltd.
FINAL REPORT Nº 3632 TP

LOCATION Admiralty Inlet
LAT : ° 'N
LONG : ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M AFT: M
CARGO ☐ BALLAST ☒
BUBBLER ON ☐ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	153	Level ice
ICE COVER 1Y 2Y+MY TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

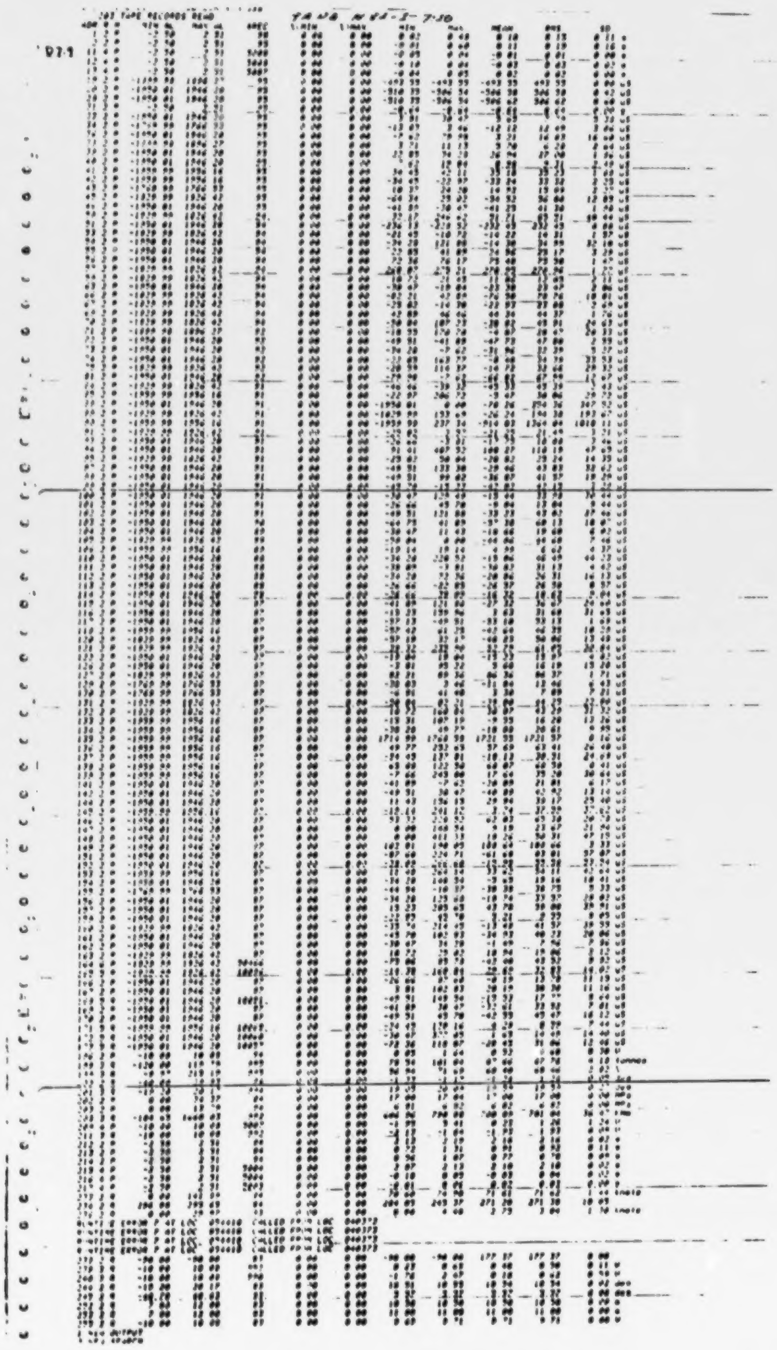
ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE 1. To determine structural response while ramming
REASON FOR SAMPLING PATTERN: 1. To collect a broad range of data for possible subsequent execution.

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS: (SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS
General sampling pattern
+ pattern B + pattern A-6 (See Appendix A)
chs 165 & 168 at 100 s/sec.
S/G removed from Pattern B



VOYAGE RECORDS

INDEX Nº 81-1-7.11
YR.-VOYAGE-TAPE FILE

DATE July 8th, 1981
RECORDING TIME 23:47:10 TO 23:48:30 GMT
ELAPSED TIME 00 H 01 M 20 S

CONTRACTOR: Fenco Consultants Ltd.
FINAL REPORT Nº 3632 TP

LOCATION Admiralty Inlet
LAT: ° 'N
LONG: ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☐ BUBBLER ON ☐
AFT: M BALLAST ☒ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	153	Level ice
ICE COVER 1Y 2Y+MY TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE 1. To determine structural response while ramming.

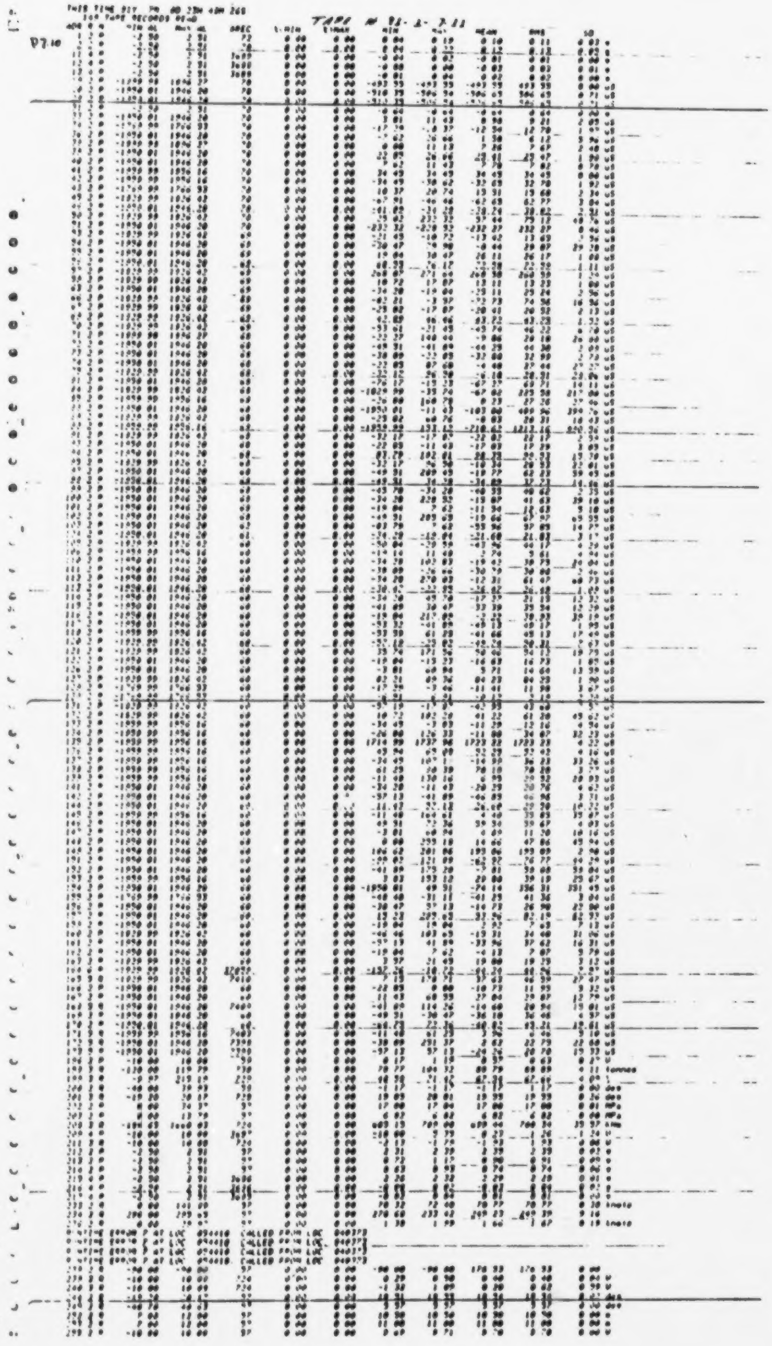
REASON FOR SAMPLING PATTERN: 1. To collect a broad range of data for possible subsequent analysis.

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME: TO GMT
PHOTOS =
TO

COMMENTS General sampling pattern
+ pattern B + pattern A-6 (See Appendix A)
+ chs 165 & 168 at 100 s/sec.
S/G removed from pattern B


TAPE # 81-1-7.11

VOYAGE RECORDS

INDEX Nº 81-1-7.12
YR. – VOYAGE – TAPE FILE

DATE July 8th, 1981

RECORDING TIME 23:51:38 TO 23:54:06 GMT
ELAPSED TIME 00 H 02 M 28 S

CONTRACTOR : Fenco Consultants Ltd.

FINAL REPORT Nº 3632 TP

LOCATION Admiralty Inlet

LAT : ° 'N
LONG : ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	153	Level ice
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

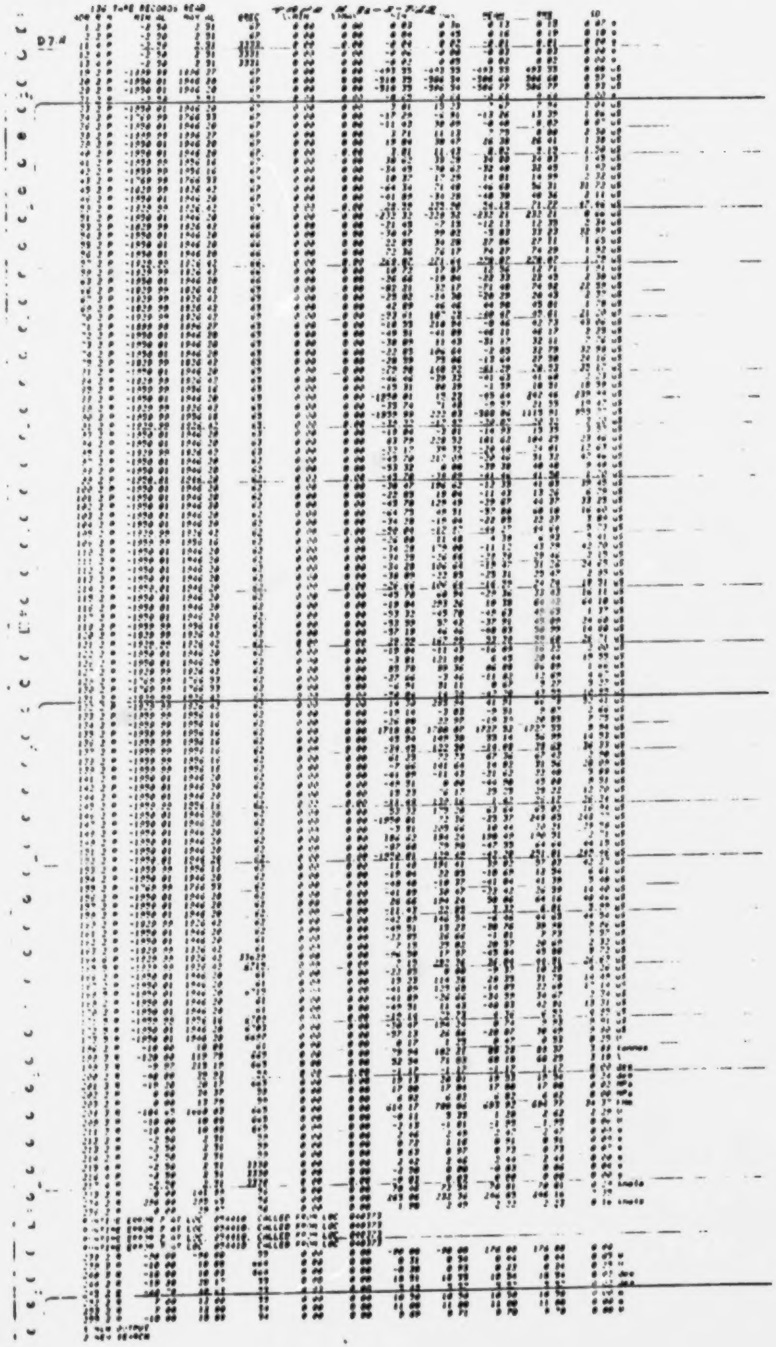
RATIONALE
REASON FOR TAPE 1. To determine structural response while ramming.
REASON FOR SAMPLING PATTERN: 1. To collect a broad range of data for possible subsequent execution.

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS General sampling pattern
+ pattern B + pattern A-6 (See Appendix A)
+ chs 165 & 168 at 100 s/sec.
S/G removed from pattern B



VOYAGE RECORDS

INDEX Nº 81-1- 7.13
YR - VOYAGE - TAPE FILE

DATE July 8/9, 1981

RECORDING TIME 23:55:50 TO 00.10:28 GMT

ELAPSED TIME 00 H 14 M 38 S

CONTRACTOR : Fenco Consultants Ltd.

FINAL REPORT Nº 3632 TP

LOCATION Admiralty Inlet

LAT : ° 'N

LONG : ° 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M CARGO ☐ BUBBLER ON ☐

AFT: M BALLAST ☑ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	153	Level ice
ICE COVER 1Y 2Y+MY TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐

NAME

FOLLOWING ☐

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE 1. To determine structural response while ramming.

REASON FOR SAMPLING PATTERN: 1. To collect a broad range of data for possible subsequent execution.

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐ INTERVAL= SECS

TAPE INFO HEADER ☐ EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

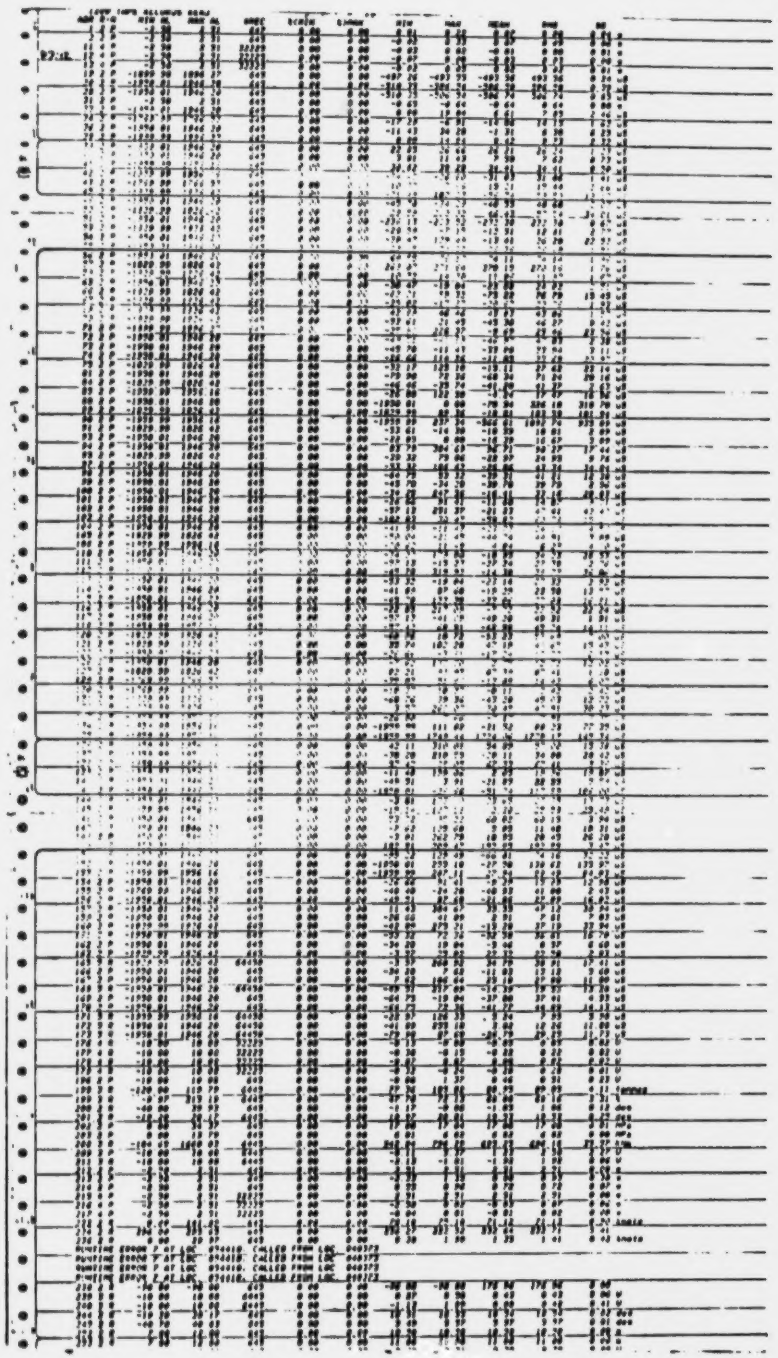
VIDEO RECORDING TAPE Nº:

TIME : TO GMT

PHOTOS =

# TO

COMMENTS General sampling pattern
+ pattern B (See Appendix A)
+ chs 168 & 165 at 100 s/sec



VOYAGE RECORDS

INDEX Nº
81-1-8.1
YR.-VOYAGE-TAPE FILE

DATE July 9th, 1981

RECORDING TIME 00:18:45 TO GMT

ELAPSED TIME H M S

CONTRACTOR : Fenco Consultants Ltd.

FINAL REPORT Nº 3632 TP

LOCATION

LAT : ° 'N

LONG : ° 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M

AFT: M

CARGO ☐

BALLAST ☒

BUBBLER ON ☐

OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	122	Level ice
ICE COVER 1Y 2Y+MY TOT	TENTHS				Ship speed 2 knots
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐

NAME

FOLLOWING ☐

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN: To collect a broad range of data for possible subsequent analysis

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐

INTERVAL= SECS

TAPE INFO HEADER ☐

EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

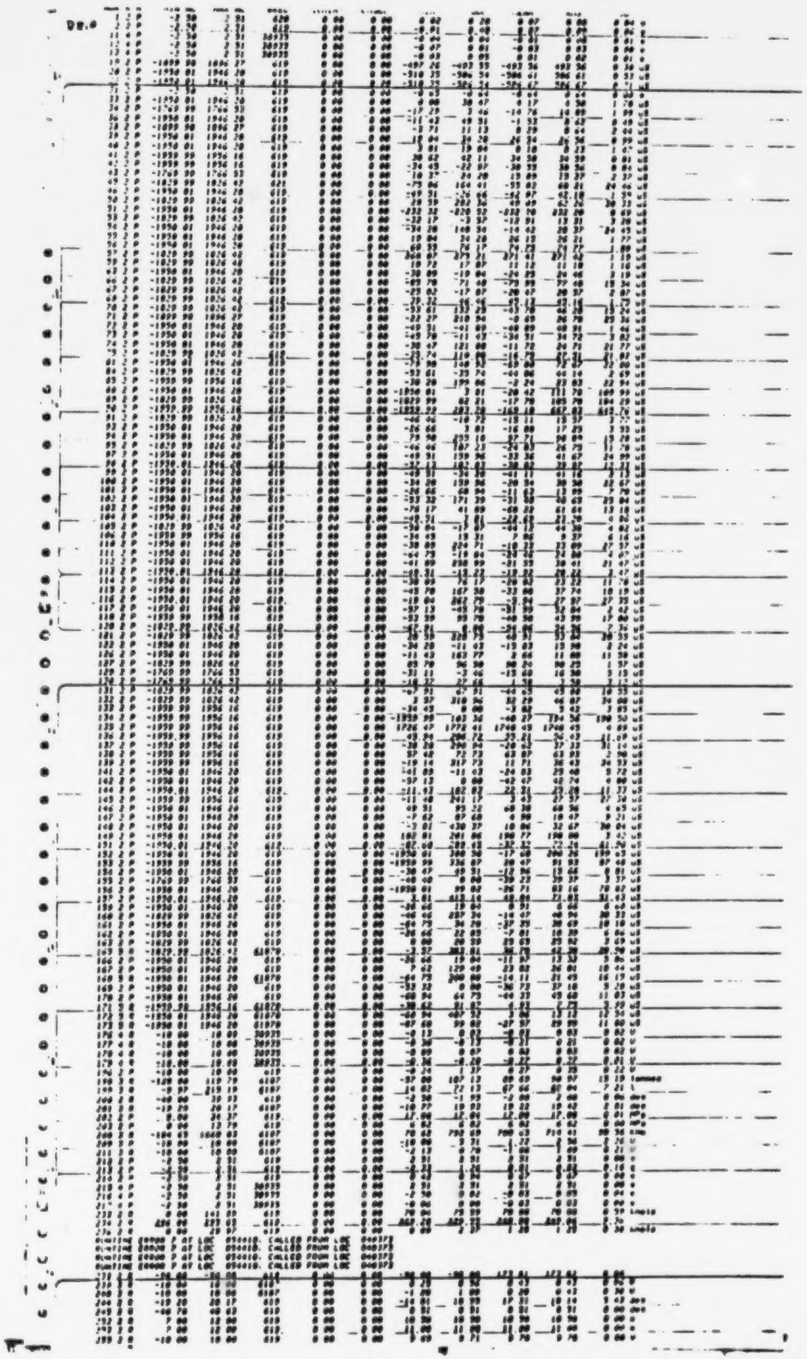
VIDEO RECORDING TAPE Nº:

TIME : TO GMT

PHOTOS =

# TO

COMMENTS General sampling pattern
+ pattern A-3 (See Appendix A)



VOYAGE RECORDS

INDEX Nº
81-1-8.2
YR.-VOYAGE-TAPE FILE

DATE July 9th, 1981

RECORDING TIME 00:30:30 TO 01:24:00 GMT

ELAPSED TIME 00 H 53 M 30 S

CONTRACTOR : Fenco Consultants Ltd.

FINAL REPORT Nº 3632 TP

LOCATION Admiralty Inlet

LAT : ° 'N

LONG : ° 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD! M

AFT: M

CARGO ☐

BALLAST ☒

BUBBLER ON ☐

OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	122	Level ice Speed = 2 knots
ICE COVER IY 2Y+MY TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐

NAME

FOLLOWING ☐

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN: 1. To collect a broad range of data for possible subsequent analysis.

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐

INTERVAL= SECS

TAPE INFO HEADER ☐

EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

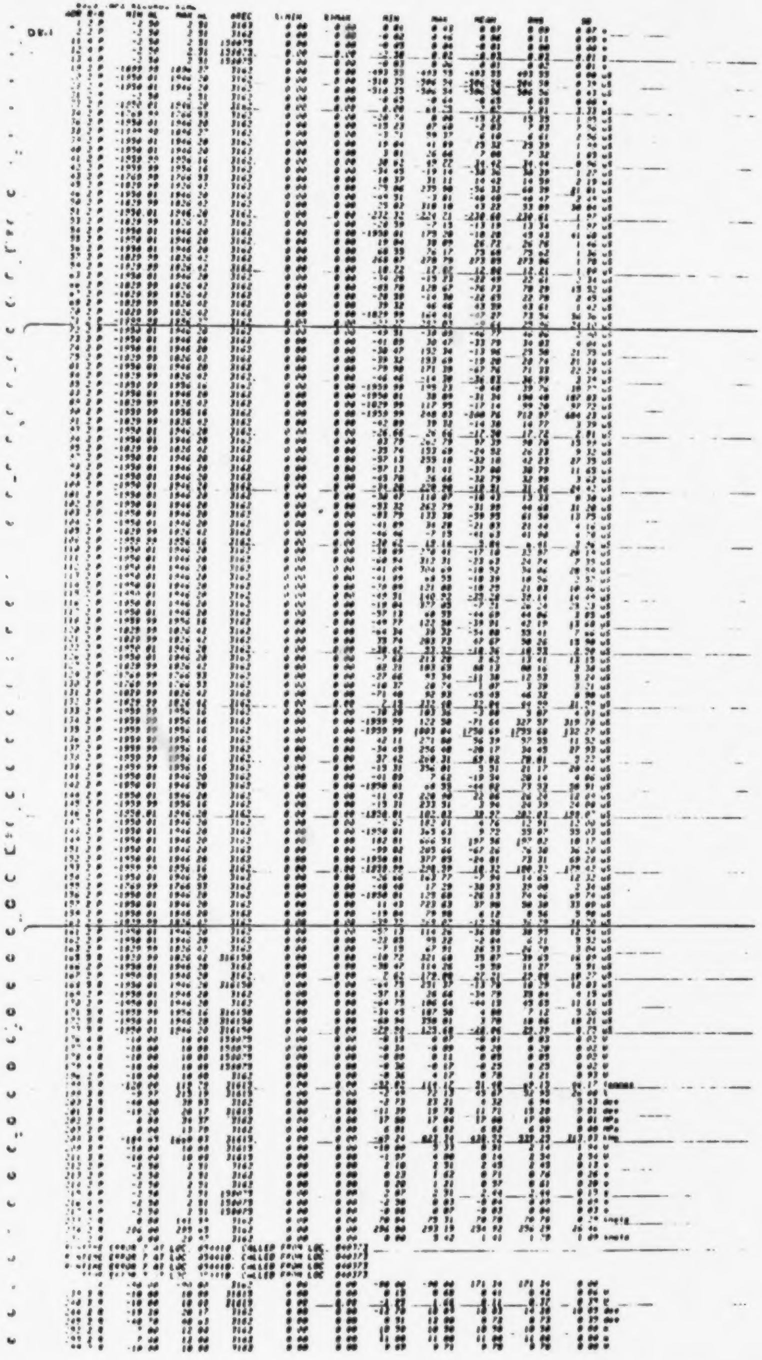
VIDEO RECORDING TAPE Nº:

TIME : TO GMT

PHOTOS =

# TO

COMMENTS General sampling pattern
+ pattern A-3 (See Appendix A)



VOYAGE RECORDS

INDEX Nº 81-2-9.1
YR.–VOYAGE–TAPE FILE

DATE July 12th, 1981

RECORDING TIME 06:21:50 TO 06:25:40 GMT
ELAPSED TIME 00 H 03 M 50 S

CONTRACTOR : Fenco Consultants Ltd.

FINAL REPORT Nº 3632 TP

LOCATION Admiralty Inlet
LAT : ° 'N
LONG : ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☒
BALLAST ☐
BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				Broken channel speed = 10 knots
ICE COVER 1Y 2Y+MY TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS		*		
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

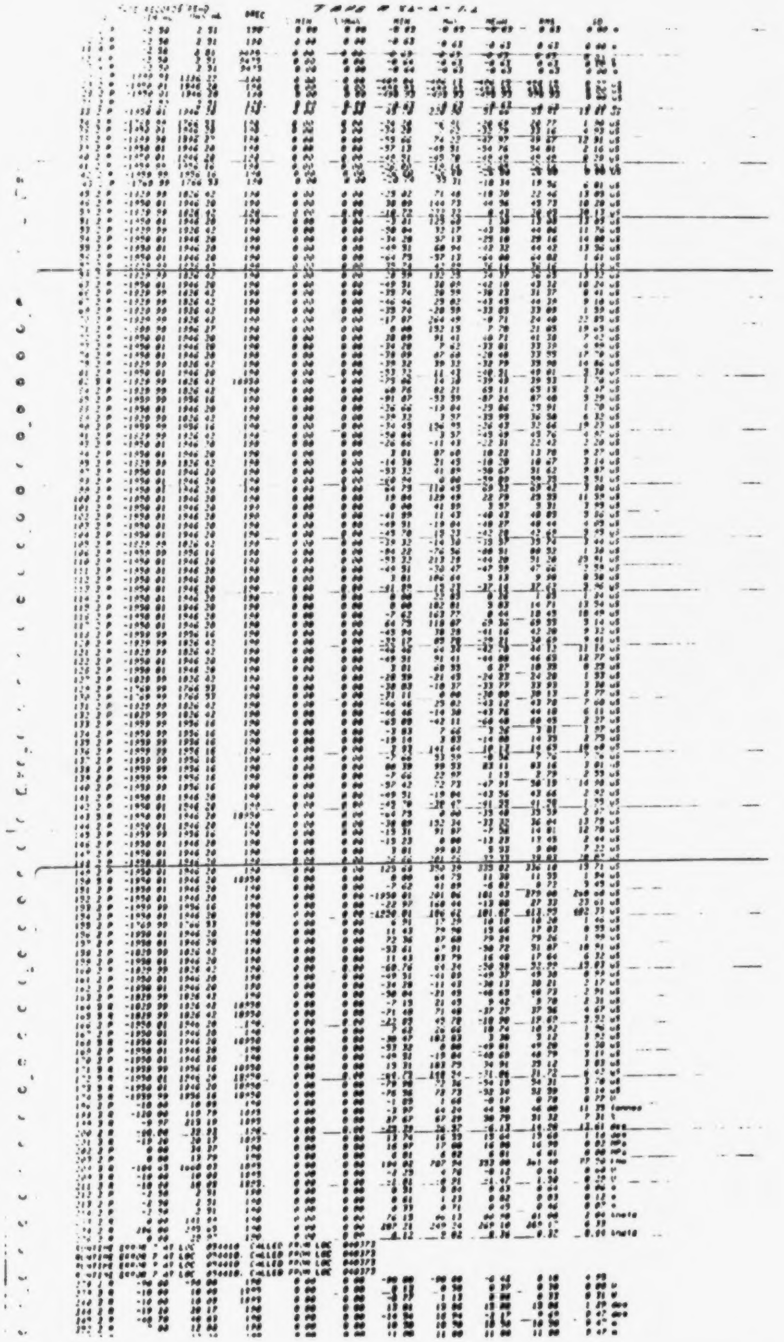
RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: 1. To collect a broad range of data for possible subsequent analysis.

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS General sampling pattern
+ pattern A-4 + pattern B (See Appendix A)



VOYAGE RECORDS

INDEX Nº 81-2-9.2
YR. - VOYAGE - TAPE FILE

DATE July 12, 1981

RECORDING TIME 09:14:30 TO GMT
ELAPSED TIME H M S

CONTRACTOR : Fenco Consultants Ltd.

FINAL REPORT Nº 3632 TP

LOCATION Admiralty Inlet

LAT : ° 'N
LONG : ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☒ BUBBLER ON ☐
AFT: M BALLAST ☐ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				Broken channel speed = 10 knots
ICE COVER [1Y | 2Y+MY | TOT]	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS		*		
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

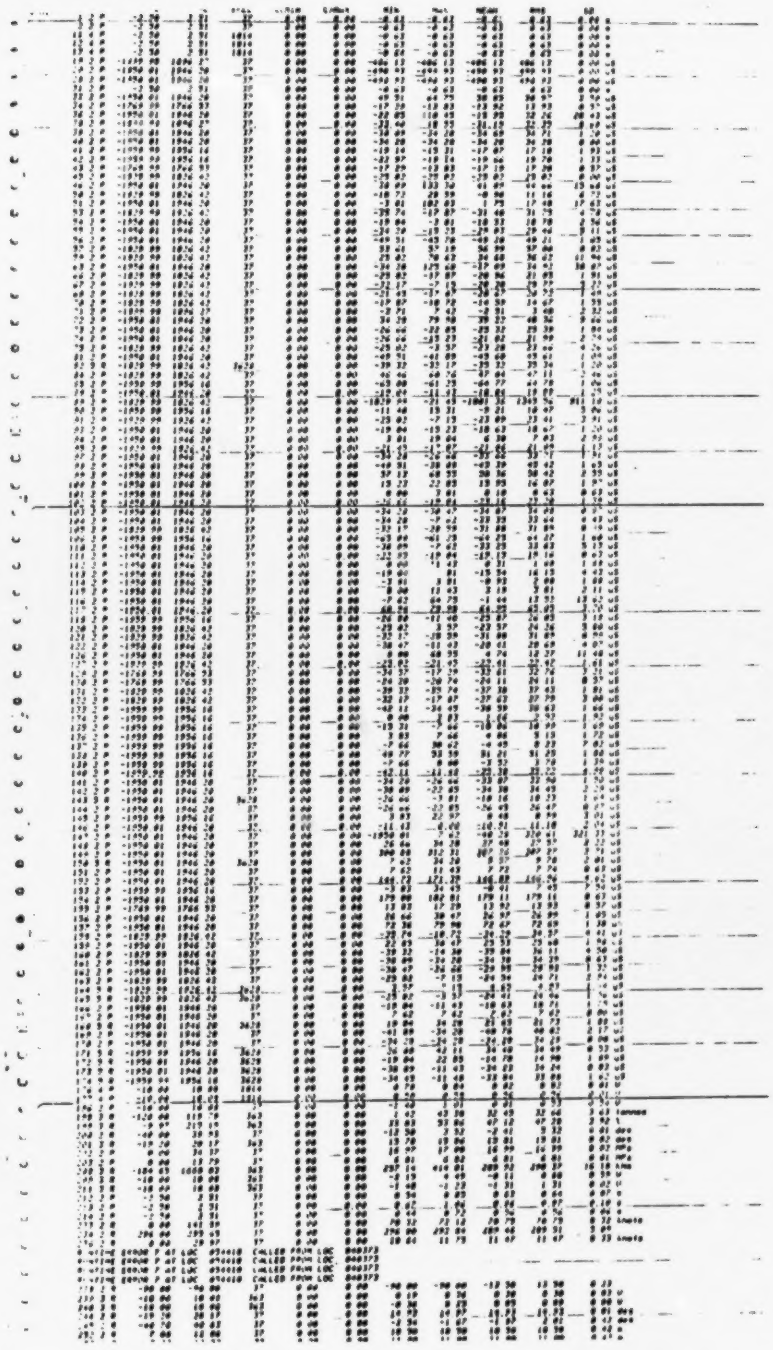
RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: 1. To collect a broad range of data for possible subsequent analysis.

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS General sampling pattern
+ pattern B + pattern A-4 (See Appendix A)



VOYAGE RECORDS

INDEX Nº 81-2- 9.3
YR.-VOYAGE-TAPE FILE

DATE July 12th, 1981

RECORDING TIME 07:15:50 TO 07:18:10 GMT
ELAPSED TIME 00 H 02 M 20 S

CONTRACTOR : Fenco Consultants Ltd.

FINAL REPORT Nº 3632 TP

LOCATION Admiralty Inlet

LAT : ° 'N
LONG : ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☒
BALLAST ☐
BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				Broken channel speed = 10 knots
ICE COVER [1Y] [2Y+MY] [TOT]	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS		*		
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

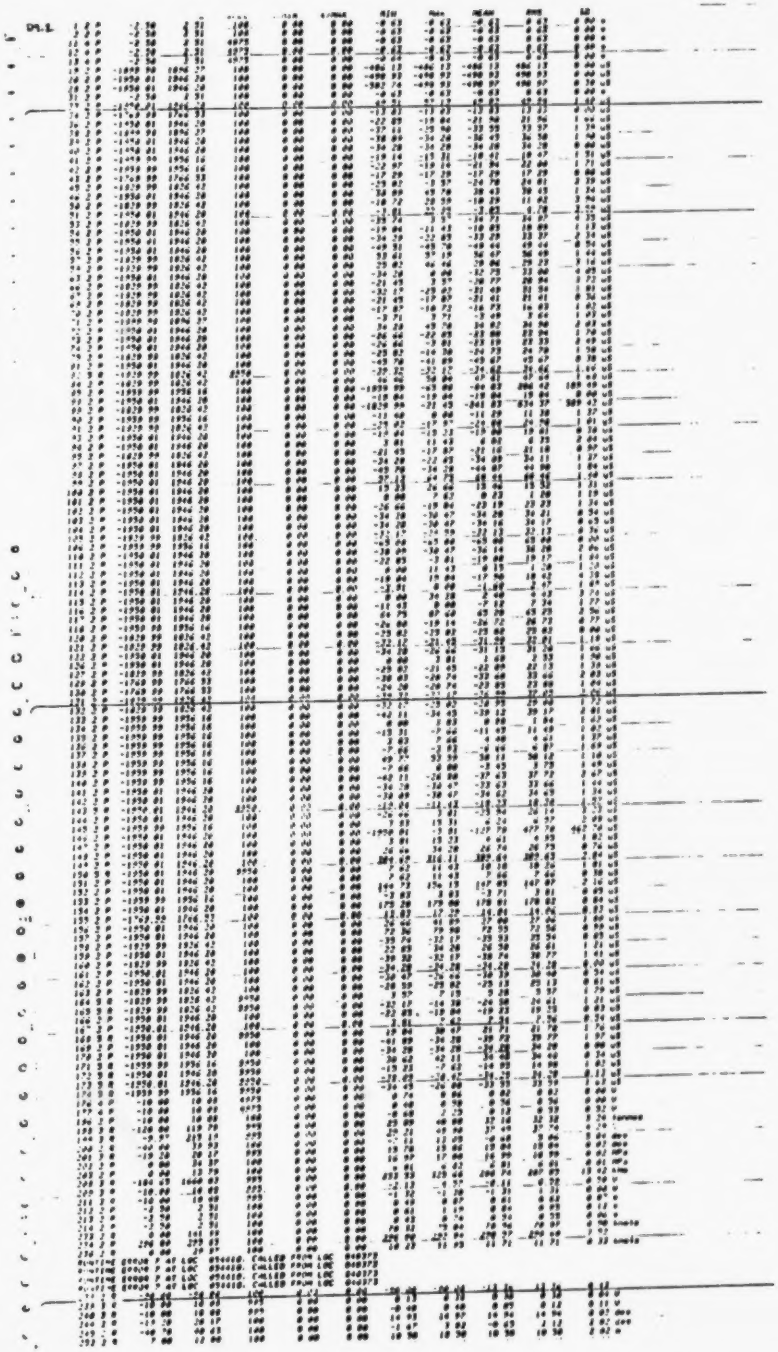
RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: 1. To collect a broad range of data for possible subsequent analysis

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS General sampling pattern
+ pattern B + pattern A-4 (See Appendix A)



VOYAGE RECORDS

INDEX Nº 81-2-9.4
YR.-VOYAGE-TAPE FILE

DATE July 12th, 1981

RECORDING TIME 07:19:12 TO 07:21:00 GMT

ELAPSED TIME 00 H 01 M 48 S

CONTRACTOR: Fenco Consultants Ltd.

FINAL REPORT Nº 3632 TP

LOCATION Admiralty Inlet

LAT: ° 'N

LONG: ° 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M

AFT: M

CARGO ☒

BALLAST ☐

BUBBLER ON ☐

OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				Broken channel speed = 10 knots
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

CHANNEL / MODE	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS		*		
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐

NAME

FOLLOWING ☐

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN: 1. To collect a broad range of data for possible subsequent analysis

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐

INTERVAL= SECS

TAPE INFO HEADER ☐

EOF ☐

OMIT CHANNELS: (SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:

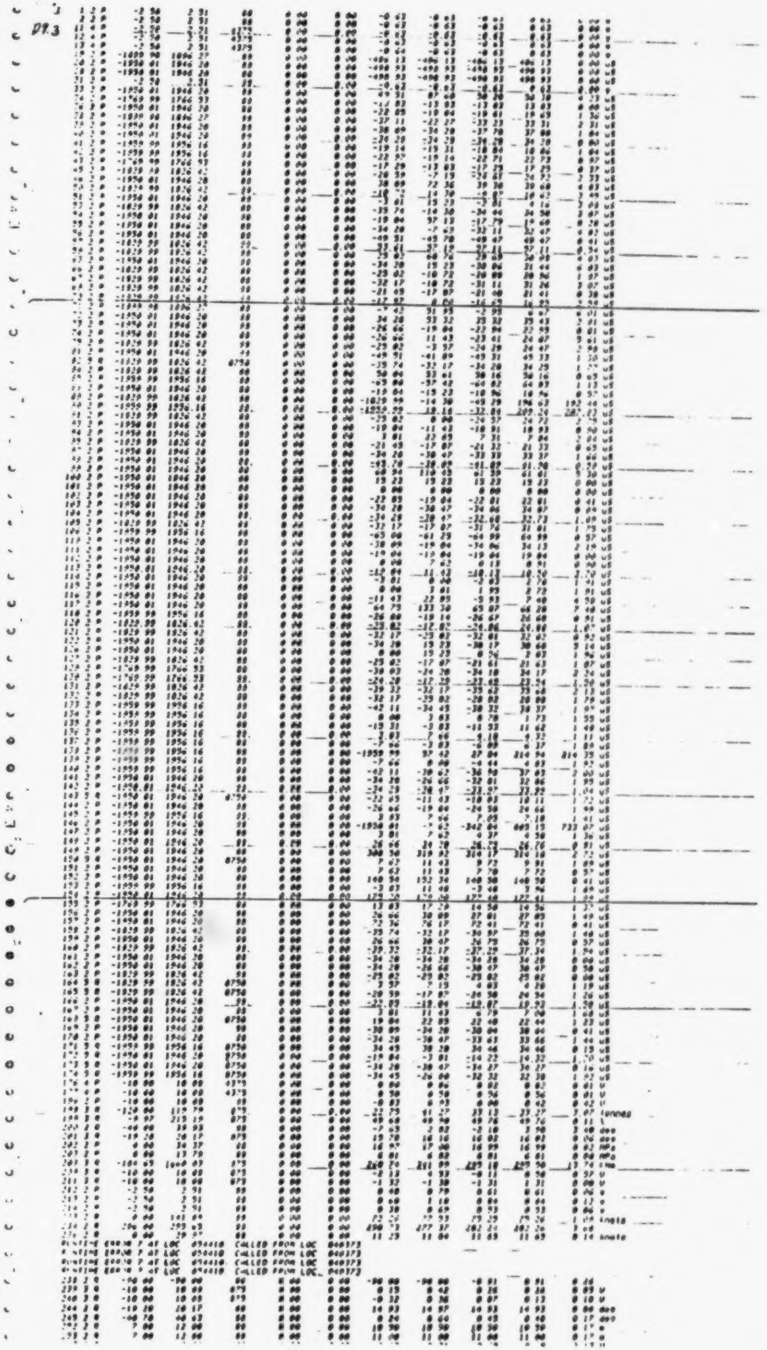
TIME: TO GMT

PHOTOS =

# TO

COMMENTS

General sampling pattern
+ pattern B + pattern A-4 (See Appendix A)



VOYAGE RECORDS

INDEX Nº 81-2-9.5
YR. – VOYAGE – TAPE FILE

DATE July 12th, 1981

RECORDING TIME 07:21:56 TO 07:32:10 GMT
ELAPSED TIME 00 H 10 M 14 S

CONTRACTOR : Fenco Consultants Ltd.

FINAL REPORT Nº 3632 TP

LOCATION Admiralty Inlet

LAT : ° 'N
LONG : ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M

CARGO ☒
BALLAST ☐

BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				Broken channel ships speed = 10 knots
ICE COVER 1Y 2Y+MY TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐

NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN: 1. To collect a broad range of data for possible subsequent analysis.

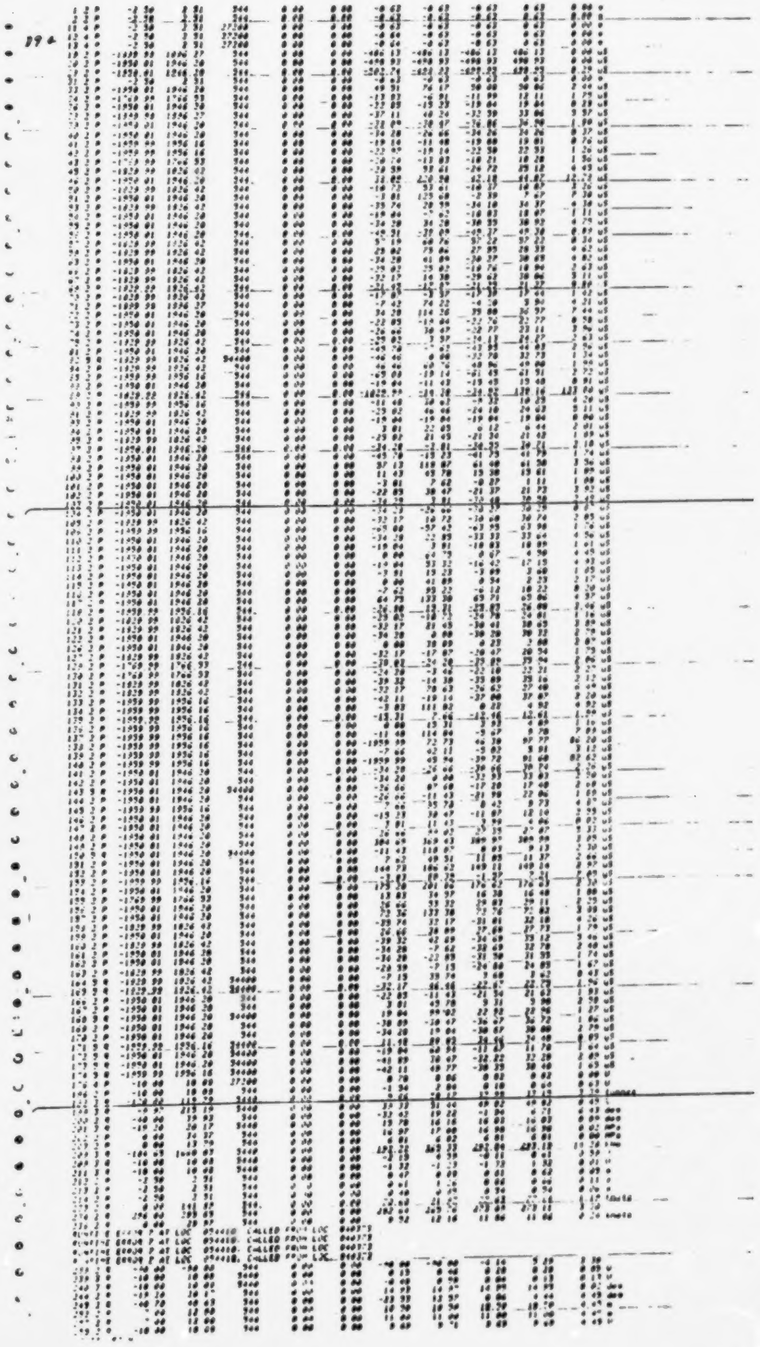
RECORDING NOTES

MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT

PHOTOS =
TO

COMMENTS General sampling pattern
+ pattern B + pattern A-4 (See Appendix A)



VOYAGE RECORDS

INDEX Nº 81-2-9.6
YR. – VOYAGE – TAPE FILE

DATE July 12th, 1981
RECORDING TIME 07:33:50 TO 08:10:10 GMT
ELAPSED TIME 00 H 36 M 20 S

CONTRACTOR : Fenco Consultants Ltd.
FINAL REPORT Nº 3632 TP

LOCATION Admiralty Inlet
LAT : ° 'N
LONG : ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☒
BALLAST ☐
BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				Broken channel ships speed = 10 knots
ICE COVER 1Y | 2Y+MY | TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

CHANNEL / MODE	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS		*		
RAMMING				
ASTERN				
TURNING				

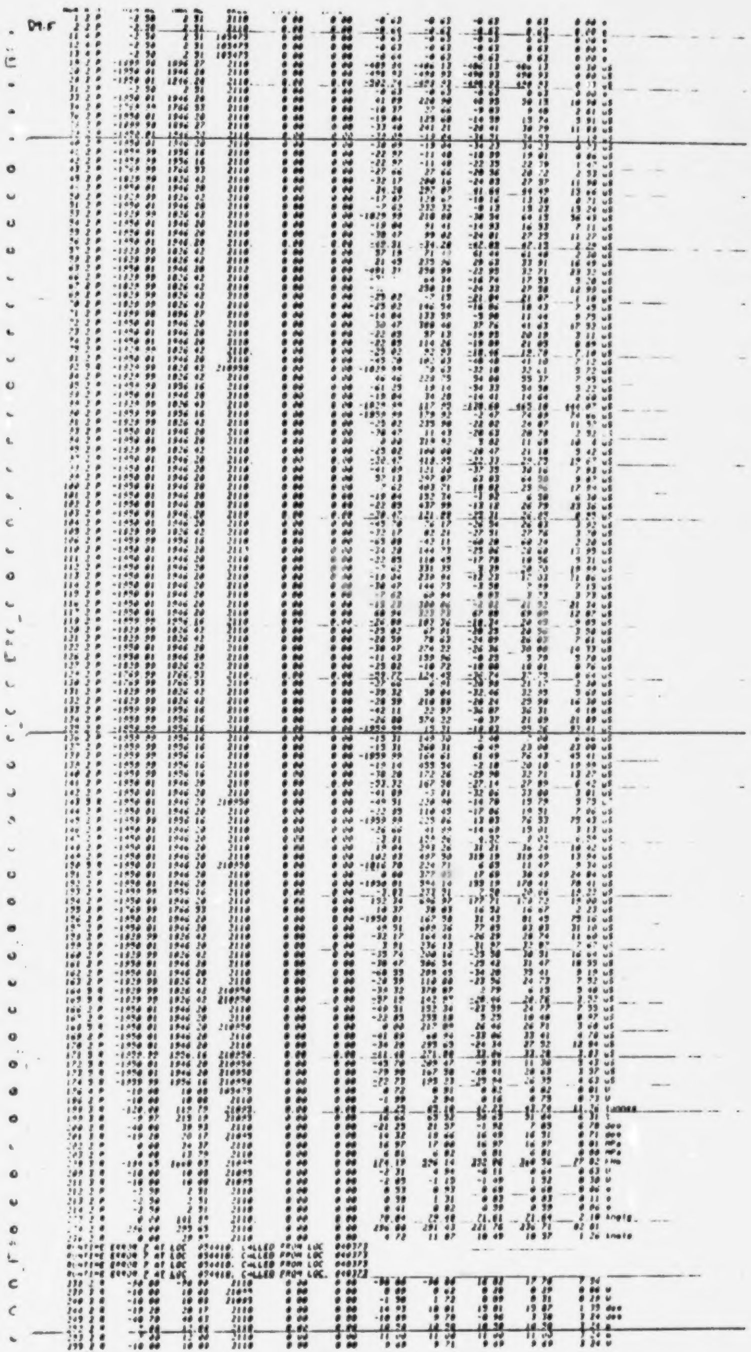
ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: 1. To collect a broad range of data for possible subsequent analysis

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS
General sampling pattern
+ pattern B + pattern A-4 (See Appendix A)



VOYAGE RECORDS

INDEX Nº 81-2-10.1
YR.-VOYAGE-TAPE FILE

DATE: July 12th, 1981
RECORDING TIME 08:27:30 TO 09:24:27 GMT
ELAPSED TIME 00 H 56 M 57 S

CONTRACTOR: Fenco Consultants Ltd.
FINAL REPORT Nº 3632 TP

LOCATION: Admiralty Inlet
LAT: ° 'N
LONG: ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☑
BALLAST ☐
BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				Closed channel speed = 10 knots
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS		*		
RAMMING				
ASTERN				
TURNING				

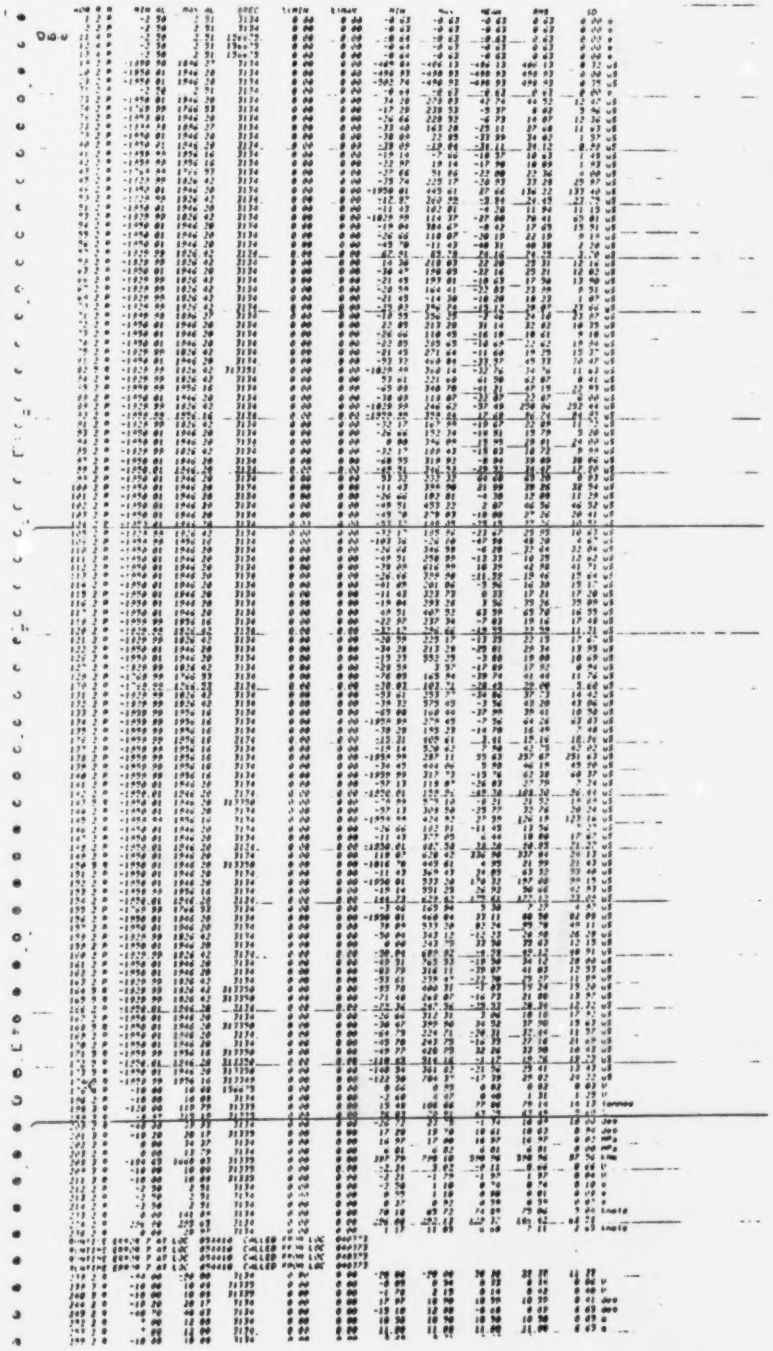
ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: 1. To collect a broad range of data for possible subsequent analysis.

RECORDING NOTES
MODE: RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO: HEADER ☐
EOF ☐
OMIT CHANNELS: (SEE APPENDIX A)

VIDEO RECORDING
TIME: TO GMT
TAPE Nº:
PHOTOS =
TO

COMMENTS: General sampling pattern
+ pattern A-6 + pattern B (See Appendix A)



VOYAGE RECORDS

INDEX Nº 81-111.1
YR.-VOYAGE-TAPE FILE

DATE July 16th, 1981
RECORDING TIME 16:18:57 TO GMT
ELAPSED TIME H M S

CONTRACTOR : Fenco Consultants Ltd.
FINAL REPORT Nº 3632 TP

LOCATION Off Cape Farewell
LAT : ° 'N
LONG : ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☒ BUBBLER ON ☐
AFT: M BALLAST ☐ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				Pack ice Speed = 5 knots
ICE COVER 1Y / 2Y+MY / TOT	TENTHS		*	1	
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

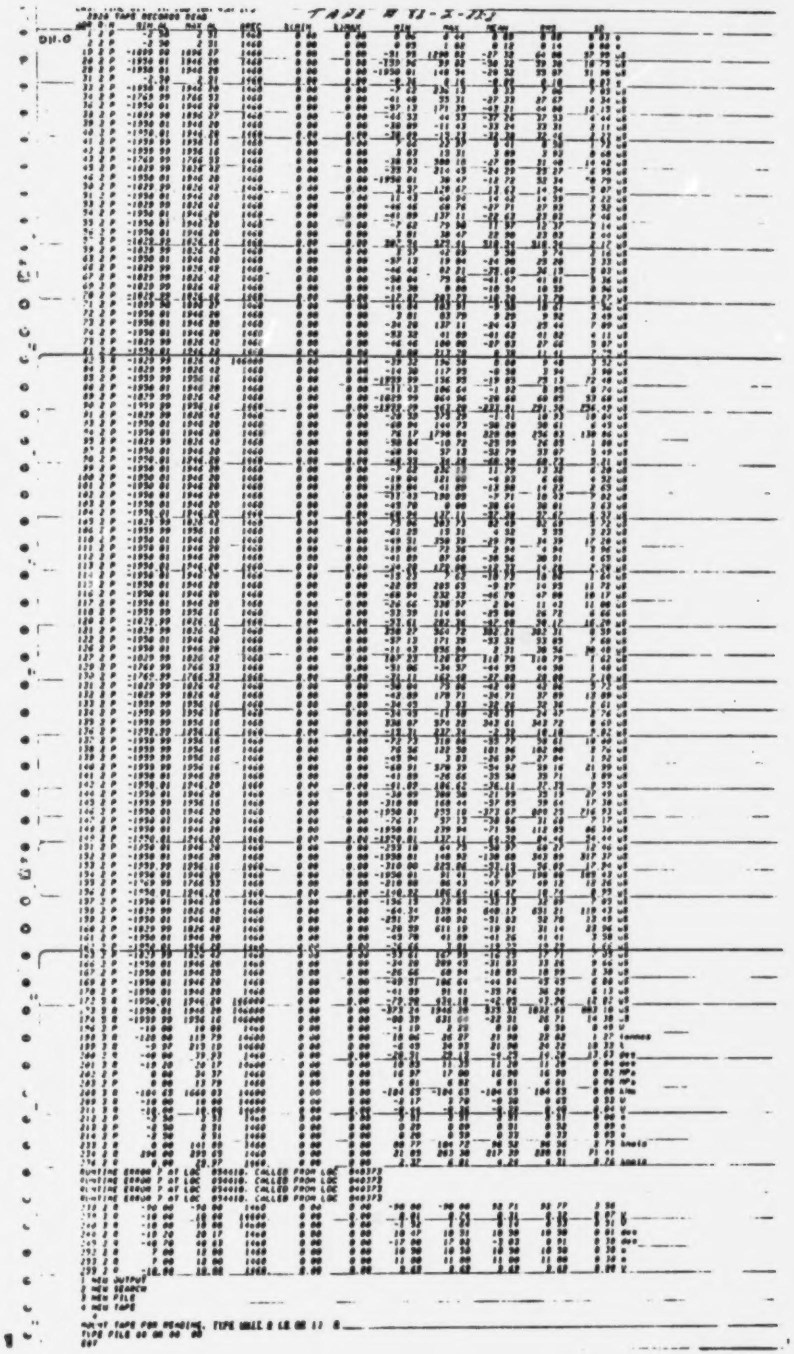
ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: 1. To collect a broad range of data for possible subsequent analysis

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS General sampling pattern



VOYAGE RECORDS

INDEX Nº 81-2-11.2
YR.-VOYAGE-TAPE FILE

DATE July 16th, 1981

RECORDING TIME 17:02:32 TO 17:15:04 GMT

ELAPSED TIME 0 H 12 M 32 S

CONTRACTOR : Fenco Consultants Ltd.

FINAL REPORT Nº 3632 TP

LOCATION Off Cape Farewell

LAT : ° 'N

LONG : ° 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M

AFT: M

CARGO ☒

BALLAST ☐

BUBBLER ON ☐ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				Pack ice speed = 5 knots
ICE COVER 1Y / 2Y+MY / TOT	TENTHS		*		
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐

NAME

FOLLOWING ☐

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN: 1. To collect a broad range of data for possible subsequent analysis

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐

INTERVAL= SECS

TAPE INFO HEADER ☐

EOF ☐

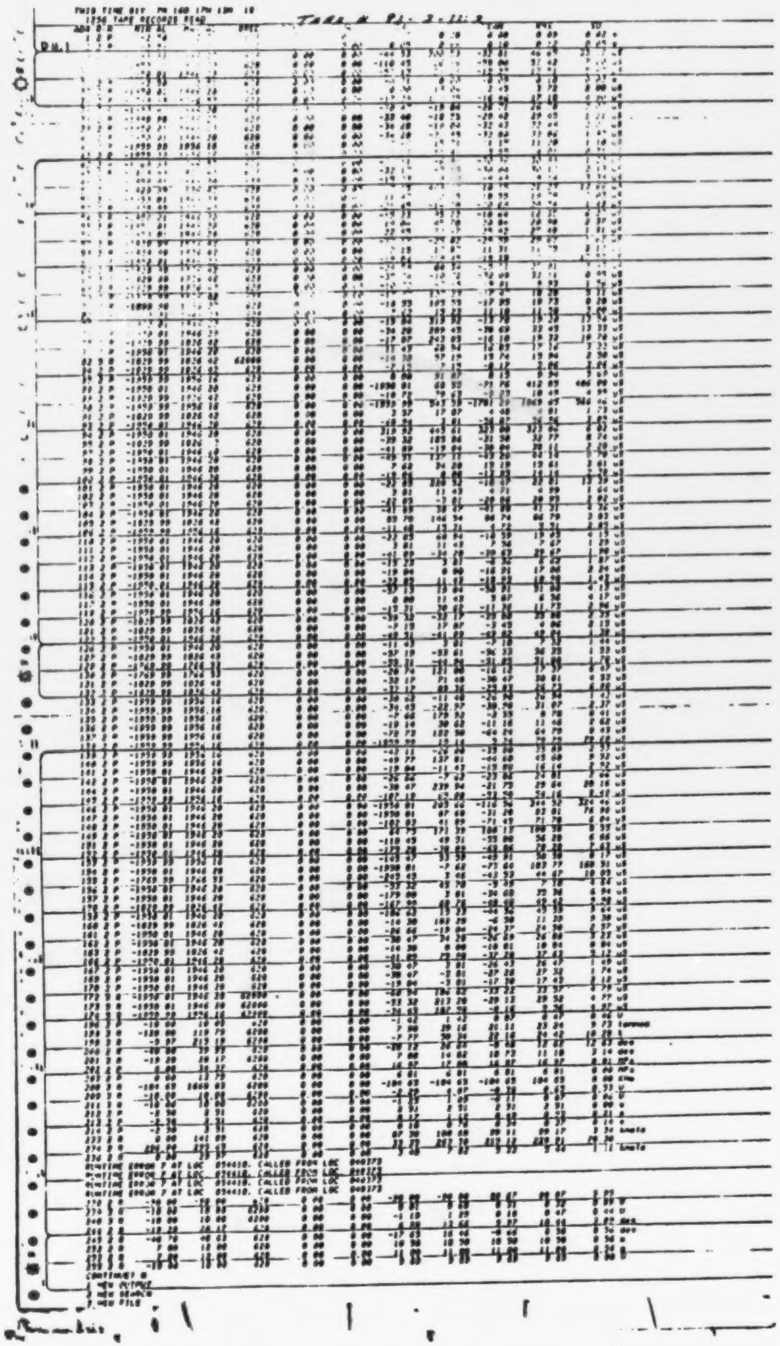
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:

TIME : TO GMT

PHOTOS =
TO

COMMENTS General sampling pattern



2.4.2 LATE ARCTIC RECORDING SEASON - 1981

In the late season operated by Arctec Canada Ltd., the M.V. ARCTIC made 2-1/2 round trips to Nanisivik (6th September 1981 to 27th November 1981) during which 49 tapes were recorded. Ice conditions in this half of the season were exceptionally light except on the last trip out of Nanisivik.

Due to damage to the ship while docking at Nanisivik, it docked for repairs at Amsterdam from the 16th to 26th September 1981. A siezed piston on 3rd October 1981 delayed entry to Nanisivik until 8th October 1981.

Statistical printouts for some tapes recorded during the Late 1981 Season are not available. Hence, individual sampling patterns are based on information obtained from the operators reports.

TABLE 2.1
SAMPLING PATTERNS

1981 Season - Voyages 6 - 10

Channel	A_1	A_2	A_3	A_4	B_1	B_2	B_3	B_4	C_1	C_2	C_3	D	E	F	G_1	G_2	H	I_1	I_2	J
#	* 09/6	11/4	11/8	11/12	10/18	11/4	11/8	11/12	11/4	11/8	11/12	11/15	10/18	11/7	11/8	11/12	11/8	11/5	11/12	11/15
1	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
2	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R		3R	4P	4P		3R	3R	3R
12	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R		3R	4P	4P		3R	3R	3R
13	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R		3R	4P	4P		3R	3R	3R
14																				
15																				
16																				
17																				
18																				
19	2P				2P								2P							
20	2P				2P								2P							
21	2P				2P								2P							
22																				
23																				
24																				
25																				
26																				
27																				
28																				
29																				
30																				
31																				
32																				
33	2P				2P								2P							
34	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
35	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
36	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
37																				
38	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
39	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
40	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
41	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
42	2P			2P	2P			2P			2P	2P	2P			2P			2P	2P
43	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
44																				
45	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
46	2P				2P								2P							
47																				
48																				

* Denotes date - Month/Day

TABLE 2.1
SAMPLING PATTERNS
1981 Season - Voyages 6 - 10

Page 2

Channel	A_1	A_2	A_3	A_4	B_1	B_2	B_3	B_4	C_1	C_2	C_3	D	E	F	G_1	G_2	H	I_1	I_2	J
#	* 09/6	11/4	11/8	11/12	10/18	11/4	11/8	11/12	11/4	11/8	11/12	11/15	10/18	11/7	11/8	11/12	11/8	11/5	11/12	11/15
49	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
50	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
51	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
52	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
53	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
54	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
55	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
56	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
57			2P	2P			2P	2P		2P	2P	2P			2P	2P			2P	2P
58	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
59	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
60																				
61																				
62																				
63	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
64	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
65	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
66	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
67	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
68																				
69	2P				2P								2P							
70	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
71																				
72	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
73	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
74	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
75	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
76	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
77																				
78																				
79	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
80	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
81	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
82	2P																			
83	2P				5R	5R	5R	5R										5R	5R	5R
84																				
85	2P				2P								2P							
86	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
87																				
88																				
89	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
90	2P				2P								2P							
91	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
92	5R	5R	5R	5R																
93	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
94	2P	2P	2P		2P	2P	2P		2P	2P			2P	2P	2P			2P		
95	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
96																				

* Denotes date - Month/Day

TABLE 2.1
SAMPLING PATTERNS
1981 Season - Voyages 6 - 10

Channel	A$_1$	A$_2$	A$_3$	A$_4$	B$_1$	B$_2$	B$_3$	B$_4$	C$_1$	C$_2$	C$_3$	D	E	F	G$_1$	G$_2$	H	I$_1$	I$_2$	J
#	• 09/6	11/4	11/8	11/12	10/18	11/4	11/8	11/12	11/4	11/8	11/12	11/15	10/18	11/7	11/8	11/12	11/8	11/5	11/12	11/15
97	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
98	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
99	2P				2P								2P							
100																				
101	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
102	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
103	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
104	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
105	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
106	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
107																				
108	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
109																				
110	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
111	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
112	2P			2P	2P			2P			2P	2P	2P			2P			2P	2P
113	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
114	2P				2P								2P							
115	2P				2P								2P							
116	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
117	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
118	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
119																				
120	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
121	2P				2P								2P							
122	2P				2P								2P							
123	5R	5R	5R	5R	5R	5R	5R	5R										5R	5R	5R
124	5R	5R	5R	5R	5R	5R	5R	5R										5R	5R	5R
125	5R	5R	5R	5R	5R	5R	5R	5R										5R	5R	5R
126	2P		2P	2P	2P		2P	2P		2P	2P	2P	2P		2P	2P			2P	2P
127																				
128	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
129																				
130	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
131	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
132	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
133	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
134	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
135			2P	2P			2P	2P		2P	2P	2P			2P	2P			2P	2P
136	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
137	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
138			2P	2P			2P	2P		2P	2P	2P			2P	2P			2P	2P
139	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
140			2P	2P			2P	2P		2P	2P	2P			2P	2P			2P	2P
141	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
142	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
143																				
144	2P				2P								2P							

• Denotes date - Month/Day

TABLE 2.1
SAMPLING PATTERNS
1981 Season - Voyages 6 - 10

Channel	A_1	A_2	A_3	A_4	B_1	B_2	B_3	B_4	C_1	C_2	C_3	D	E	F	G_1	G_2	H	I_1	I_2	J
#	* 09/6	11/4	11/8	11/12	10/18	11/4	11/8	11/12	11/4	11/8	11/12	11/15	10/18	11/7	11/8	11/12	11/8	11/5	11/12	11/15
145	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
146			2P	2P			2P	2P		2P	2P	2P			2P	2P		2P	2P	2P
147	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
148	2P			2P	2P			2P			2P	2P	2P			2P			2P	2P
149	2P				2P								2P							
150	5R	5R	5R	5R	5R	5R	5R	5R				5R						5R	5R	5R
151	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
152	2P				2P								2P							
153	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
154																				
155	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
156	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
157	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
158																				
159																				
160	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
161	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
162	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
163	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
164		2P			5R	5R	5R	5R				5R						5R	5R	5R
165																				
166	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
167	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
168																				
169	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
170	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
171	5R	2P	5R	5R	5R	5R	5R	5R				5R						5R	5R	5R
172												5R								
173												5R								
174	5R	5R	5R	2P				2P			2P	5R				2P			2P	2P
175												5R								
176	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	5R
177	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	5R
178	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	5R
179	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	5R
180																				
181																				
182																				
183																				
184																				
185																				
186																				
187																				
188																				
189																				
190																				
191																				
192																				

* Denotes date - Month/Day

TABLE 2.1
SAMPLING PATTERNS
1981 Season - Voyages 6 - 10

Channel	A_1	A_2	A_3	A_4	B_1	B_2	B_3	B_4	C_1	C_2	C_3	D	E	F	G_1	G_2	H	I_1	I_2	J
#	* 09/6	11/4	11/8	11/12	10/18	11/4	11/8	11/12	11/4	11/8	11/12	11/15	10/18	11/7	11/8	11/12	11/8	11/5	11/12	11/15
193																				
194																				
195																				
196	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R		3R	3R	3R
197																				
198	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	6R	3R	3R	3R	3R	3R	3R
199	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R		2R	2R	2R
200	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R		2R	2R	2R
201	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R
202	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R		2R	2R	2R
203	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R		2R	2R	2R
208	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	6R	3R	3R	3R	3R	3R	3R
209	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R
211	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	3R	2R	2R	2R
212	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
213	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
214	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P	2P		2P	2P	2P
215	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R		3R	4P	4P		3R	3R	3R
216	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R		3R	4P	4P		3R	3R	3R
217	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R		3R	4P	4P		3R	3R	3R
224	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R		1R	1R	1R
225	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R		1R	1R	1R
226	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R		1R	1R	1R
228																				
229																				
230	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R		1R	1R	1R
231	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R		1R	1R	1R
232	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R		1R	1R	1R
233	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R		2R	2R	2R
234	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R		2R	2R	2R
235																				
236	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R
237	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R		2R	2R	2R
238	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R		2R	2R	2R
239	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R		3R	3R	3R
240	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R	3R		3R	3R	3R
241																				
242																				
243																				
244	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R		2R	2R	2R
245	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R	2R		2R	2R	2R
252	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R		1R	1R	1R
253	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R		1R	1R	1R
255	2R	2R	2R	2R	2R	2R	1R	1R	1R	1R	1R	1R	1R	1R	1R	1R		1R	1R	1R

* Denotes date - Month/Day

TABLE 2.2

SAMPLING PATTERN SELECTION

RATE PATTERN	PATTERN SUMMARY	OBJECTIVE
A	High Rate on 7 Strain Gauges	Used in Backing and Ramming Conditions - to capture time series strain data during impact
B	High Rate on 7 Different Strain Gauges	
C	Peak Mode on All Strain Gauges	Used in continuous transit 1st yr ice - to collect general statistics
D	Time Series on 7 Different Gauges	As for A and B
E	Peak Mode on All Strain Gauges and Accelerometers	Ship Response in 1st yr ice, 4/10 coverage
F	High Rate on Thrust and Torque	To capture ice milling incidents; unable to detect ice milling
G	High Rate on Accelerometers	To capture dynamic hull response during ramming with noticeable ship bending
H	Propulsion and Ship Speed Only	Doppler Log Calibrations
I	High Rate on 7 gauges and Torque and Thrust	Backing and Ramming with Milling
J	High Rate on Mid Ship Gauges	To capture hull bending during ramming (noticeable ship bending.

VOYAGE LOG

Late Arctic Season 1981

Voyage No.	Origin - Destination (Dates)	Tape Numbers (number of files)	Video Tape No.	Dates in Ice (total time)	Recording Time (hr:min:sec)	
					in ice	total
81-6	Nanisivik - Amsterdam (Sept 6 - Sept 16)	1(4), 2(7), 3(2), 4(16)				
81-7	Amsterdam - Nanisivik (Sept 26 - Oct 8)	5(1), 6(4), 7(4)				
81-8	Nanisivik - Antwerp (Oct 9 - Oct 18)	8(2), 11(1)				
81-9	Antwerp - Nanisivik (Oct 21 - Nov 3)	12(7), 13(7), 14(3), 15(4), 16(3), 17(3), 18(4), 19(6), 20(4), 21(1), 22(5), 23(1), 24(2), 25(6), 26(2), 27(1), 28(2), 29(3), 30(1)	VT2, VT3, VT4			
81-10	Nanisivik - Antwerp (Nov 11 - Nov 27)	31(1), 32(1), 33(1), 34(1), 35(1), 36(2), 37(1), 38(1), 39(3), 40(1), 41(1), 42A(1), 42B(1), 43(3), 44(6), 45(1), 46(1), 47(5), 48(2), 49(2)	VT4, VT5, VT6			

LOCATION AT WHICH TAPES WERE RECORDED
(Sept.6 - Oct.8)

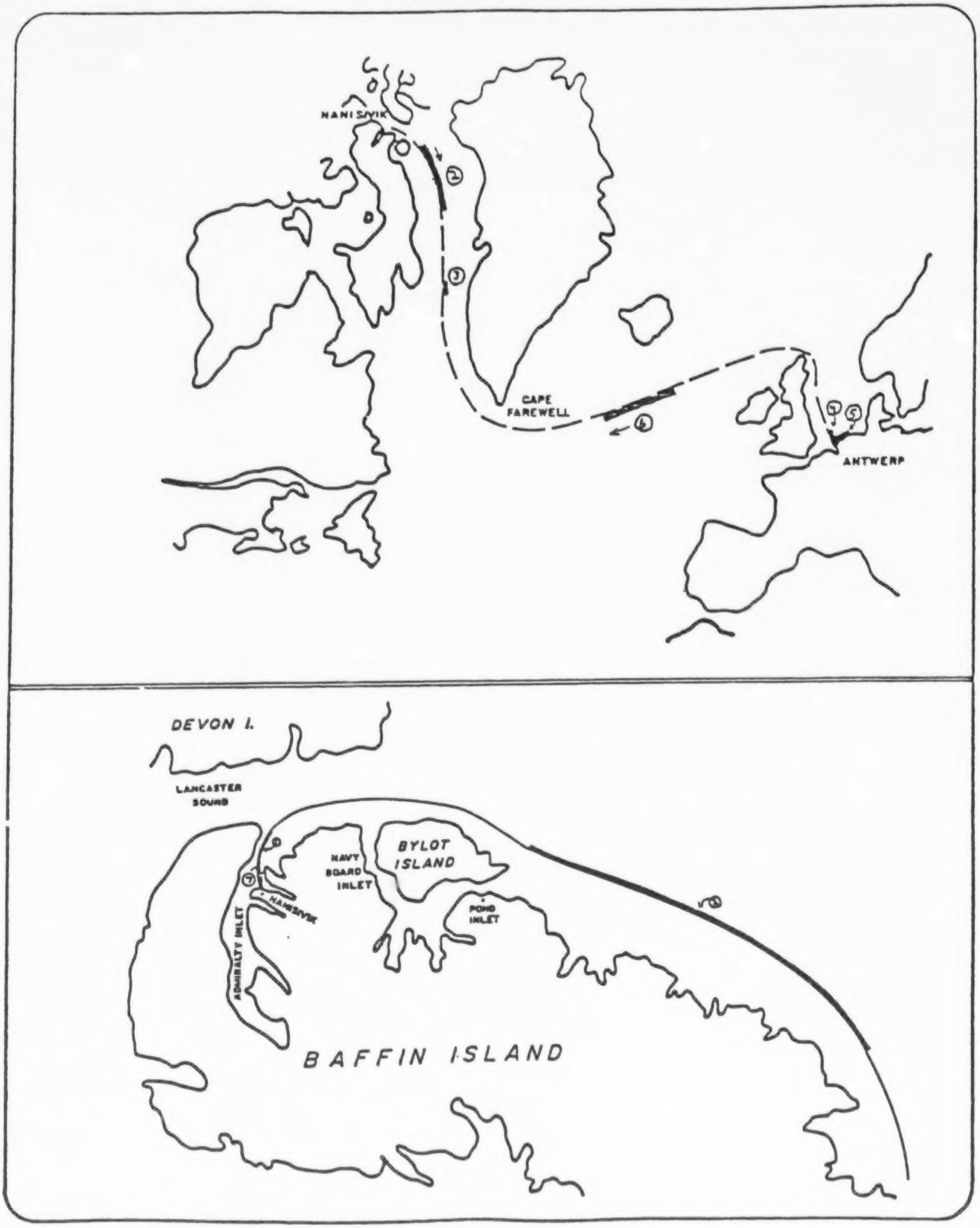
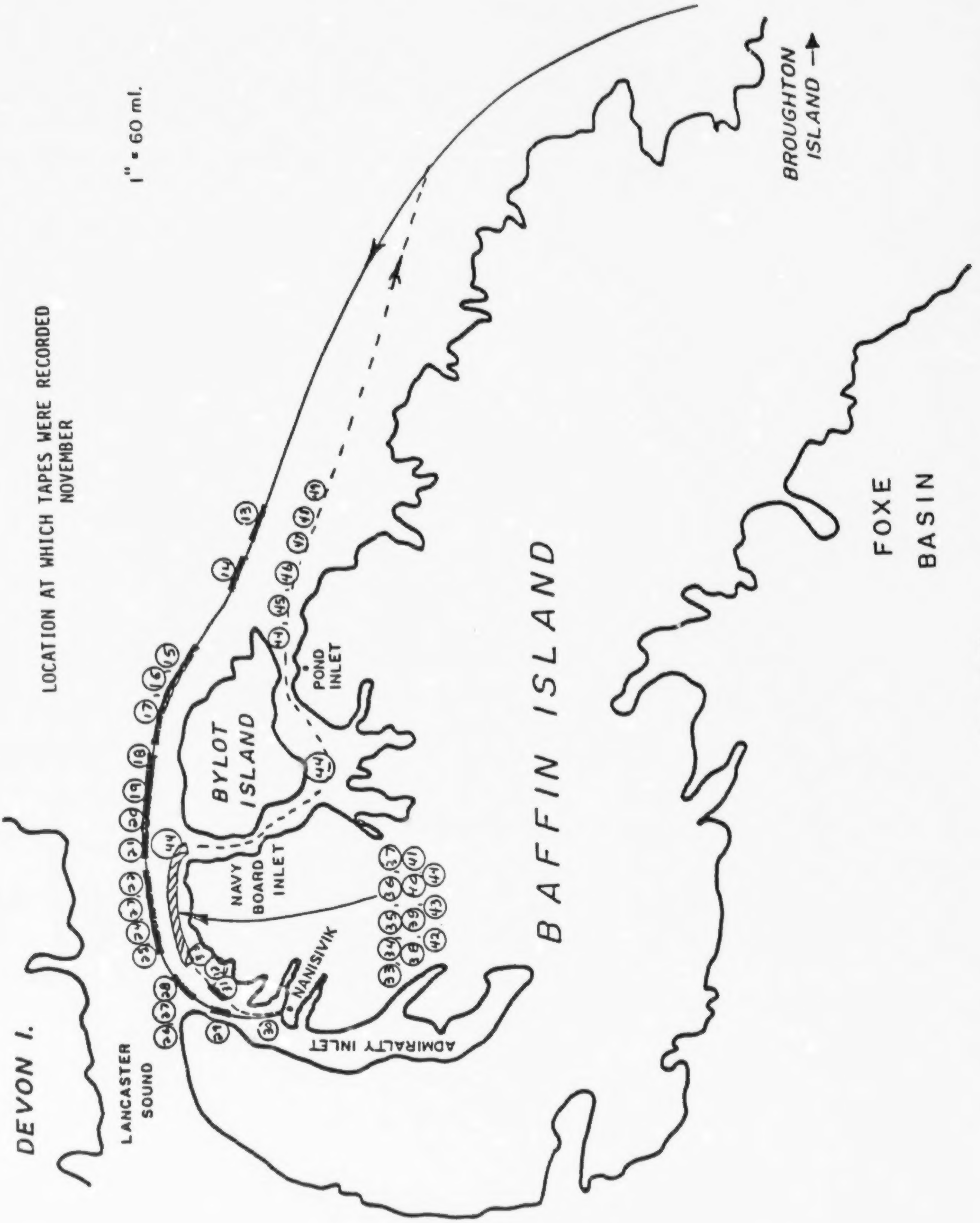

NANISIVIK
②
③
CAPE FAREWELL
⑥
⑦
⑤
ANTWERP
DEVON I.
LANCASTER SOUND
NAVY BOARD INLET
BYLOT ISLAND
POND INLET
NANISIVIK
ADMIRALTY INLET
BAFFIN ISLAND

Figure 2.16

LOCATION AT WHICH TAPES WERE RECORDED
NOVEMBER


1" = 60 mi.
DEVON I.
LANCASTER SOUND
BYLOT ISLAND
NAVY BOARD INLET
NANISIVIK
ADMIRALTY INLET
POND INLET
BAFFIN ISLAND
FOXE BASIN
BROUGHTON ISLAND →
13
14
15
16
17
18
19
20
21
22
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27
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44
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46
47
48
49

Figure 2.17

VOYAGE RECORDS

INDEX Nº

YR. – VOYAGE – TAPE FILE

DATE 6th September – 23rd October 1981 RECORDING TIME TO GMT

ELAPSED TIME H M S

CONTRACTOR: Arctec Canada Ltd. FINAL REPORT Nº TP

LOCATION LAT: ° 'N LONG: ° . 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M CARGO ☐ BUBBLER ON ☐

AFT: M BALLAST ☐ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				
ICE COVER IY 2Y+MY TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				*
RAMMING				
ASTERN				*
TURNING				*

ICEBREAKER SUPPORT ☐

NAME

FOLLOWING ☐

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN:

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐ INTERVAL= SECS

TAPE INFO HEADER ☐ EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: PHOTOS =

TIME: TO GMT # TO

COMMENTS

Summary of Tapes 81-6-1 to 81-9-12

(All open water)

TAPE INDEX NO.	NO. OF FILES	DATE-TIME (GMT)	RECORDING TIME	PREDOM SAMPLING PATTERN	DESCRIPTION
81-6-1	4	6 Sep. 1700	35 min.	A1	Nanisivik Dock and light seas
81-6-2	7	7-8 Sep.	66 min.	A1	Light seas
81-6-3	2	9 Sep.	57 min.	A1	Moderate ahead seas with roll
81-6-4	16	17-18 Sep.	43 min.	A1	Manoeuvring in Antwerp
81-7-5	1	26 Sep.	3 hrs.	A1	Manoeuvring open water
81-7-6	4	28 Sep.	40 min.	A1	Moderate to heavy seas
81-7-7	4	5 Oct.	30 min.	A1	Docking in Nanisivik
81-8-8	2	17 Oct.	1 hr.	A1	System tests in open water, no roll
9					Reused at a later date
10					Reused at a later date
81-8-11	1	18 Oct.	47 min.	B1	Docking in Antwerp - system test
81-9-12	7	22-23 Oct.	1 hr.	B1	Leaving Antwerp - Tests with ''LIPS''

VOYAGE RECORDS

INDEX Nº 81-9-13.1
YR.-VOYAGE-TAPE FILE

DATE 3rd November 1981

RECORDING TIME 13:26:52 TO 13:31:32 GMT
ELAPSED TIME 00 H 04 M 40 S

CONTRACTOR: Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Baffin Bay

LAT: 72 ° 47 'N
LONG: 73 ° 32 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: 11.5 M
AFT: 11.0 M

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	15	20	Young ice and open water
ICE COVER (IY / 2Y+MY / TOT)	TENTHS		*	10	10	
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME: TO GMT

PHOTOS =
TO

COMMENTS Sampling pattern E

No printout available

VOYAGE RECORDS

INDEX Nº 81-9-13.2
YR.-VOYAGE-TAPE FILE

DATE 3rd November 1981
RECORDING TIME 15:10 TO 15:33 GMT
ELAPSED TIME 00 H 17 M 00 S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Baffin Bay
LAT : 72 ° 47 'N
LONG : 73 ° 32 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	15	20	9/10 pancake ice
ICE COVER 1Y 2Y+MY TOT	TENTHS		*	10	10	1/10 1st yr. & growlers
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					Ship's speed = 15 knots

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

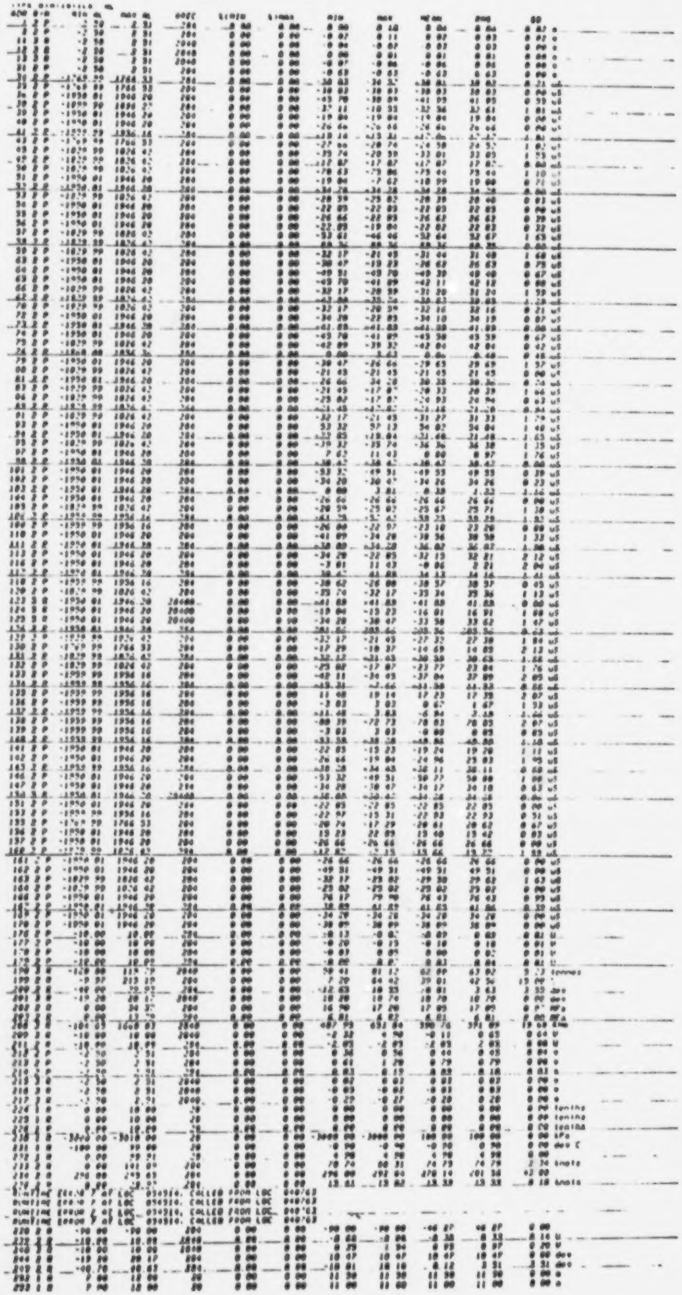
RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS: (SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT2
TIME : TO GMT
PHOTOS =
# TO

COMMENTS Sampling pattern E

81-9 - 13.2



VOYAGE RECORDS

INDEX Nº
81-9-13.3
YR.-VOYAGE-TAPE FILE

DATE 3rd November 1981

RECORDING TIME 15:33 TO 15:43 GMT
ELAPSED TIME 00 H 10 M S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Baffin Bay

LAT : 72 ° 47 'N
LONG : 73 ° 32 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			15			20			9/10 pancake ice 1/10 1st year and growlers
ICE COVER 1Y 2Y+MY TOT	TENTHS			10		10				
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

CHANNEL / MODE	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT2
TIME : TO GMT
PHOTOS =
TO

COMMENTS Sampling pattern E
Removed visibility and cloud cover
Added filters - channels 83 & 164

No printout available

VOYAGE RECORDS

INDEX Nº
81-9-13.4
YR.-VOYAGE-TAPE FILE

DATE 3rd November 1981

RECORDING TIME 15:43 TO 16:10 GMT

ELAPSED TIME 0 H 30 M 0 S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Baffin Bay

LAT : 72 ° 47 'N

LONG : 73 ° 32 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M CARGO ☐ BUBBLER ON ☐

AFT: M BALLAST ☑ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM			10		
ICE COVER 1Y 2Y+MY TOT	TENTHS			7	7	
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐

NAME

FOLLOWING ☐

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐ INTERVAL= SECS

TAPE INFO HEADER ☐ EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT2

TIME : TO GMT

PHOTOS =
TO

COMMENTS No relevant data expected on this file - invalid
Sampling pattern E

No printout available

VOYAGE RECORDS

INDEX Nº 81-9-13.5
YR.-VOYAGE-TAPE FILE

DATE 3rd November 1981
RECORDING TIME 16:10 TO 16:26 GMT
ELAPSED TIME 00 H 16 M S

CONTRACTOR: Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Baffin Bay
LAT: 72 ° 47 'N
LONG: 73 ° 42 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM					0			38	young ice
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS			2		2	8		8	
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									ship's speed = 16 knots

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT2
TIME: TO GMT
PHOTOS =
TO

COMMENTS Sampling pattern E

No printout available

VOYAGE RECORDS

INDEX Nº 81-9-13.6
YR. – VOYAGE – TAPE FILE

DATE 3rd November 1981
RECORDING TIME 16:36 TO 17:49 GMT
ELAPSED TIME 1 H 13 M S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Baffin Bay
LAT : 72 ° 47 'N
LONG : 73 ° 32 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☐
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER				UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS				CM		*				45			
ICE COVER	1Y	2Y+MY	TOT	TENTHS		*	8		8	8		8	
SNOW COVER				CM									
FLEXURAL STRENGTH				KPa									
COMPRESSIVE STRENGTH				MPa									
FRICTION													
PRESSURE				MPa									
RIDGES													
CRYSTAL													
SALINITY				%									Ship's speed = 7 - 10 knots

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT2
TIME : TO GMT
PHOTOS =
TO

COMMENTS Sampling pattern E

No printout available

VOYAGE RECORDS

INDEX Nº
81-9-13.7
YR. – VOYAGE – TAPE FILE

DATE 3rd November 1981

RECORDING TIME 18:51 TO GMT

ELAPSED TIME H M S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Baffin Bay

LAT : 72 ° 47 'N

LONG : 73 ° 32 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M

AFT: M

CARGO ☐

BALLAST ☒

BUBBLER ON ☐

OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM						20			Large floes in vicinity
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS			7		7	7		7	
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									Ship's speed = 7 - 10 knots

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐

NAME

FOLLOWING ☐

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐

INTERVAL= SECS

TAPE INFO HEADER ☐

EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT2

TIME : TO GMT

PHOTOS =

# TO

COMMENTS Sampling pattern E

No printout available

VOYAGE RECORDS

INDEX Nº 81-9-14.1
YR.–VOYAGE TAPE FILE

DATE 3rd November 1981

RECORDING TIME 19:55 TO 19:58 GMT

ELAPSED TIME 00 H 03 M 00 S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Baffin Bay

LAT : 72 ° 47 'N

LONG : 73 ° 32 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M

AFT: M

CARGO ☐

BALLAST ☒

BUBBLER ON ☐ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM		*	20	
ICE COVER 1Y / 2Y+MY / TOT	TENTHS		*	7 7	
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐

NAME

FOLLOWING ☐

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐

INTERVAL= SECS

TAPE INFO HEADER ☐

EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:

TIME : TO GMT

PHOTOS =

TO

COMMENTS Sampling pattern B1

No printout available

VOYAGE RECORDS

INDEX Nº 81-9-14.2
YR. – VOYAGE – TAPE FILE

DATE 3rd November 1981
RECORDING TIME 19:58 TO 20:20 GMT
ELAPSED TIME 00 H 22 M S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Baffin Bay
LAT : 72 ° 47 'N
LONG : 73 ° 32 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER				UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS				CM		*				20			
ICE COVER	1Y	2Y+MY	TOT	TENTHS		*	10		10				
SNOW COVER				CM									
FLEXURAL STRENGTH				KPa									
COMPRESSIVE STRENGTH				MPa									
FRICTION													
PRESSURE				MPa									
RIDGES													
CRYSTAL													
SALINITY				%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT2
TIME : TO GMT
PHOTOS =
TO

COMMENTS Sampling pattern Bl

No printout available

VOYAGE RECORDS

INDEX Nº
81-9-14.3
YR.-VOYAGE-TAPE FILE

DATE 3rd November 1981

RECORDING TIME 20:20 TO 20:24 GMT.
ELAPSED TIME 00 H 04 M S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Baffin Bay

LAT : 72 ° 47 'N
LONG : 73 ° 32 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☐ BUBBLER ON ☐
AFT: M BALLAST ☒ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM		*				20			
ICE COVER (1Y, 2Y+MY, TOT)	TENTHS		*	10	T	10			10	T = Trace
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐
NAME
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT

PHOTOS =
TO

COMMENTS Sampling pattern B1

No printout available

VOYAGE RECORDS

INDEX Nº 81-9-15.1
YR.-VOYAGE-TAPE FILE

DATE 4th November 1981

RECORDING TIME 15:42:16 TO 17:36:15 GMT
ELAPSED TIME 01 H 53 M 59 S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Bylot Island

LAT : 73 ° 42 'N
LONG : 77 ° 08 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM			30 122	Various multi year floes in loose pack ice
ICE COVER 1Y 2Y+MY TOT	TENTHS		*	2 T 2	T = Trace
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				Ship's speed = 7 - 14 knots

TRANSIT MODE

CHANNEL / MODE	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	*
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☐

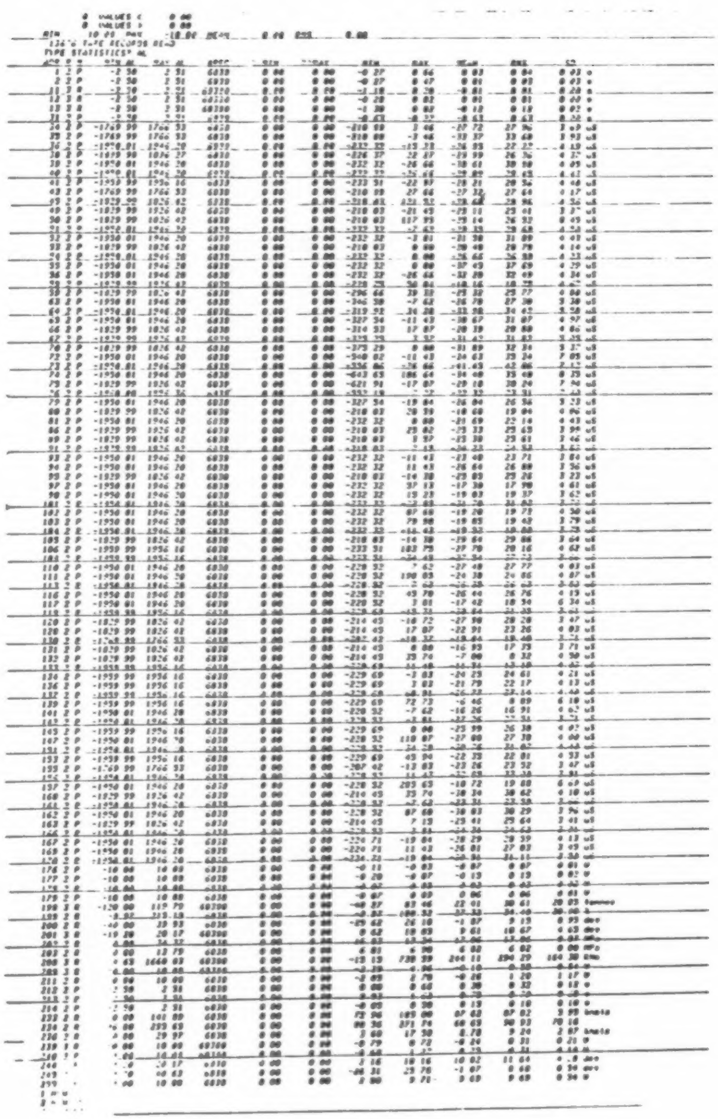
RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING
TIME : 16:40 TO 17:45 GMT
TAPE Nº : VT2
PHOTOS =
TO

COMMENTS Sampling pattern C1

81 - 9 - 15·1



VOYAGE RECORDS

INDEX Nº
81-9-15.2
YR.–VOYAGE–TAPE FILE

DATE 4th November 1981
RECORDING TIME 17:36 TO 17:48 GMT
ELAPSED TIME 0 H 12 M S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION off Bylot Island
LAT : 73 ° 42 'N
LONG : 77 ° 08 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			30	122					MY flow. Large MY impact. Gauges 128, 131, 132 and 137 damaged. T = Trace
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS			2	T	2				
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING		*		
ASTERN		*		
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING On TAPE Nº: VT2
TIME : 17:50 TO 18:06 GMT
PHOTOS =
TO

COMMENTS Sampling pattern B2

No printout available

VOYAGE RECORDS

INDEX Nº 81-9-15.3
YR.-VOYAGE-TAPE FILE

DATE 4th November 1981

RECORDING TIME 17:50 TO 17:56 GMT

ELAPSED TIME 00 H 6 M 00 S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION off Bylot Island

LAT : 73 ° 42 'N

LONG : 77 ° 08 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M CARGO ☐ BUBBLER ON ☐

AFT: M BALLAST ☒ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			30	122					Ram track
ICE COVER (1Y, 2Y+MY, TOT)	TENTHS			2	T	2				T = Trace
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									Ships speed = 0 knots

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☐

NAME CCGS Louis St. Laurent

FOLLOWING ☐

IN ATTENDANCE ☒

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐ INTERVAL= SECS

TAPE INFO HEADER ☐ EOF ☐

OMIT CHANNELS: (SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT2 PHOTOS =

TIME : TO GMT # TO

COMMENTS Sampling pattern B2

No printout available

VOYAGE RECORDS

INDEX Nº 81-9-15.4
YR.–VOYAGE–TAPE FILE

DATE 4th November 1981

RECORDING TIME 18:07 TO 18:45 GMT

ELAPSED TIME 0 H 38 M S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION off Bylot Island

LAT : 73 ° 42 'N

LONG : 77 ° 08 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M

AFT: M

CARGO ☐

BALLAST ☒

BUBBLER ON ☐

OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			30	122					Loose pack ice
ICE COVER 1Y / 2Y+MY / TOT	TENTHS			2	T	2				Small 1st year flow
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									T = Trace
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									Ships speed = 6 knots

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*		*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒

NAME CCGS Louis St. Laurent

FOLLOWING ☐

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐

INTERVAL= SECS

TAPE INFO HEADER ☐

EOF ☒

OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT2

TIME : TO GMT

PHOTOS =

# TO

COMMENTS Sampling pattern C1

No printout available

VOYAGE RECORDS

INDEX Nº 81-9-16.1
YR. – VOYAGE – TAPE FILE

DATE 4th November 1981
RECORDING TIME 18:56:13 TO 19:08:43 GMT
ELAPSED TIME H 12 M 30 S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION off Bylot Island
LAT : 73 ° 42 'N
LONG : 77 ° 08 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM				30	Loose pack ice
ICE COVER 1Y 2Y+MY TOT	TENTHS			1	1	
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL SALINITY	%					Ship speed = 9 knots

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☐

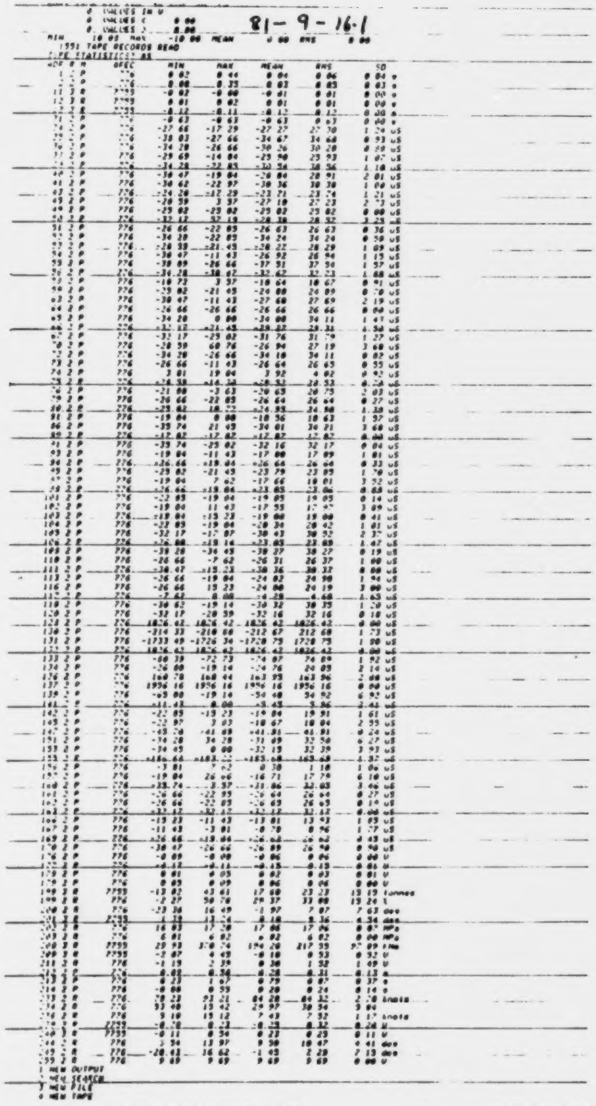
RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING
TAPE Nº: VT2
TIME : 19:00 TO 20:50 GMT
PHOTOS =
TO

COMMENTS Sampling pattern C1

81- 9 - 16.1



VOYAGE RECORDS

INDEX Nº 81-9-16.2
YR. – VOYAGE – TAPE FILE

DATE 4th November 1981

RECORDING TIME 20:31 TO 20:50 GMT
ELAPSED TIME H 19 M S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION off Bylot Island

LAT : 73 ° 42 'N
LONG : 77 ° 08 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☐ BUBBLER ON ☐
AFT: M BALLAST ☒ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS			1 1	
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				Ships speed = 1 knot

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT2
TIME : TO GMT

PHOTOS =
TO

COMMENTS Sampling pattern C1

No printout available

VOYAGE RECORDS

INDEX Nº 81-9-16.3
YR.-VOYAGE-TAPE FILE

DATE 4th November 1981
RECORDING TIME 20:50 TO 21:46:12 GMT
ELAPSED TIME 0 H 56 M 12 S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION off Bylot Island
LAT : 73 ° 42 'N
LONG : 77 ° 08 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE					COMMENTS
ICE THICKNESS	CM			30	122				
ICE COVER (IY / 2Y+MY / TOT)	TENTHS			6	3	9			
SNOW COVER	CM								
FLEXURAL STRENGTH	KPa								
COMPRESSIVE STRENGTH	MPa								
FRICTION									
PRESSURE	MPa								
RIDGES									
CRYSTAL									
SALINITY	%								Ships speed = 2.5 knots

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

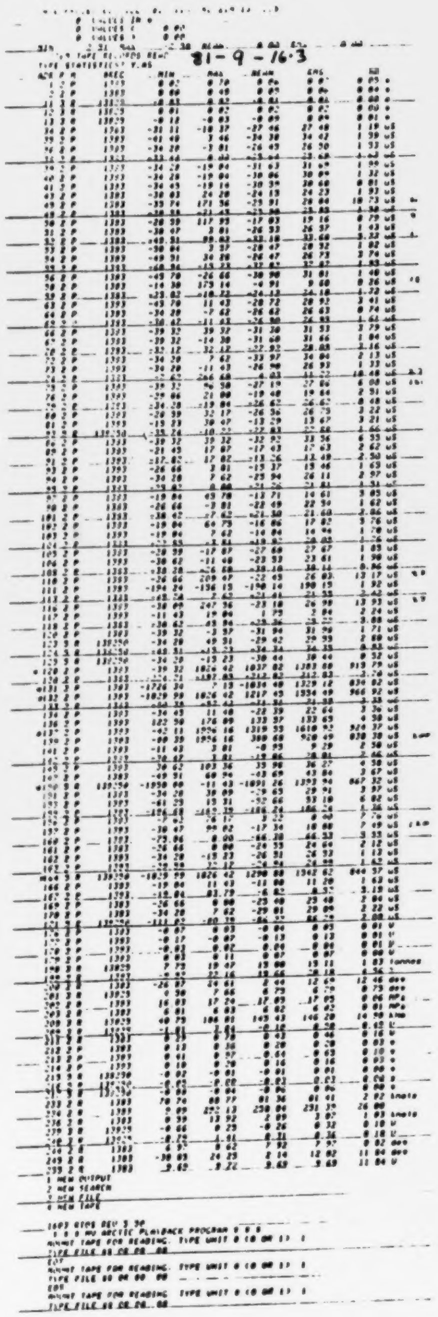
ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☒
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT2
TIME : TO GMT
PHOTOS =
TO

COMMENTS Sampling pattern B2
Printout processed from 20:50:52 to 21:13:52 only


81-9-16.3

VOYAGE RECORDS

INDEX Nº 81-9-17.1
YR. – VOYAGE – TAPE FILE

DATE 4th November 1981
RECORDING TIME 21:57 TO GMT
ELAPSED TIME H M S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION off Bylot Island
LAT : 43 ° 42 'N
LONG : 77 ° 08 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☐ BUBBLER ON ☐
AFT: M BALLAST ☒ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			30	122					
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS			6	3	9				
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT2
TIME : TO GMT
PHOTOS =
TO

COMMENTS Sampling pattern B2

No printout available

VOYAGE RECORDS

INDEX Nº 81-9-17.2
YR.-VOYAGE-TAPE FILE

DATE 5th November 1981

RECORDING TIME 13:12 TO 13:23 GMT
ELAPSED TIME 0 H 11 M S

CONTRACTOR: Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION off Bylot Island

LAT: 73 ° 42 'N
LONG: 81 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			30	122					
ICE COVER 1Y 2Y+MY TOT	TENTHS			6	3	9				
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME: TO GMT
PHOTOS =
TO

COMMENTS Sampling pattern B2 or C1

No printout available

VOYAGE RECORDS

INDEX Nº 81-9-17.3
YR. – VOYAGE – TAPE FILE

DATE 5th November 1981 RECORDING TIME TO GMT
ELAPSED TIME H M S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION off Bylot Island LAT : 73 ° 'N
LONG : 81 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☐ BUBBLER ON ☐
AFT: M BALLAST ☒ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				
ICE COVER 1Y 2Y+MY TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS No data reported on this file.

No printout available

VOYAGE RECORDS

INDEX Nº 81-9-18.1
YR. – VOYAGE – TAPE FILE

DATE 6th November 1981

RECORDING TIME 15:09 TO 15:19 GMT
ELAPSED TIME H 10 M S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION off North Coast Bylot Island

LAT : 73 ° 'N
LONG : 81 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM					
ICE COVER 1Y / 2Y+MY / TOT	TENTHS					
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPA					
FRICTION						
PRESSURE	MPa					Backing and ramming
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS: (SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS Sampling patterns B2

No printout available

VOYAGE RECORDS

INDEX Nº 81-9-18.2
YR. - VOYAGE - TAPE FILE

DATE 6th November 1981
RECORDING TIME 15:19 TO 15:57 GMT
ELAPSED TIME 0 H 38 M S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION off Bylot Island
LAT : 73 ° 'N
LONG : 81 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					Backing and ramming
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS
Sampling pattern B2

No printout available

VOYAGE RECORDS

INDEX Nº 81-9-18.3
YR. – VOYAGE – TAPE FILE

DATE 6th November 1981
RECORDING TIME 16:07 TO 16:29 GMT
ELAPSED TIME H 22 M S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION off Bylot Island
LAT : 73 ° 'N
LONG : 81 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				
ICE COVER 1Y 2Y+MY TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					Backing and ramming
CRYSTAL SALINITY	%				Multi year ice

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT2
TIME : TO GMT
PHOTOS =
TO

COMMENTS Sampling pattern B2

No printout available

VOYAGE RECORDS

INDEX Nº 81-9-18.4
YR. - VOYAGE - TAPE FILE

DATE 6th November 1981

RECORDING TIME 16:33:19 TO GMT
ELAPSED TIME H M S

CONTRACTOR: Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Off Bylot Island

LAT: 73 ° 'N
LONG: 81 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				
ICE COVER 1Y / 2Y+MY / TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT2
TIME: TO GMT
PHOTOS =
TO

COMMENTS Sampling patterns Cl or B2

No printout available

VOYAGE RECORDS

INDEX Nº 81-9-19.1
YR. – VOYAGE – TAPE FILE

DATE 5th November 1981
RECORDING TIME 19:28:17 TO 20:31:18 GMT
ELAPSED TIME 1 H 3 M 1 S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound
LAT : 73 ° 'N
LONG : 82 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM			33 185	
ICE COVER 1Y 2Y+MY TOT	TENTHS			10 T 10	T = Trace
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

RATIONALE
REASON FOR TAPE Doppler calibration
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT2
TIME : TO GMT
PHOTOS =
TO

COMMENTS Sampling patterns I1 or B2

```
LAST TIME 81Y 11M  5D 20H 31M 20S
        0. VALUES IN V
        0. VALUES <  -184.65
        0. VALUES >  1077.59
MIN:     10.08  MAX:   -10.00  MEAN:      0.00  RMS:      0.00
  7568 TAPE RECORDS READ.
TYPE STATISTICS? AS
ADR R/M      #REC       MIN       MAX      MEAN       RMS         SD
198 4 R   189200.    -74.76     94.48    -16.53     38.14      34.37 tonnes
199 3 R    37840.     -2.49     71.03     37.74     41.11      16.30 %
200 3 R    37840.    -24.92     24.61     -0.76      4.57       4.51 deg
201 3 R    37840.    -14.16     17.97     -5.60     11.11       9.60 deg
208 4 R   189200.   -184.65    774.65    270.16    301.51     133.88 KNm
209 4 R   189200.     -2.29      5.02     -0.09      0.53       0.52 V
211 3 R    37840.     -2.13      5.35      0.03      1.82       1.82 V
233 3 R    37840.     70.32     89.88     78.98     79.01       2.24 knots
234 3 R    37840.    296.00    294.59    279.11    280.28      25.58
236 3 R    37840.      0.00     29.97      2.55      3.37       2.20 knots
255 3 R    37840.     -9.39      9.77      9.67      9.69       2.20 V
1 NEW OUTPUT
2 NEW SEARCH
3 NEW FILE
4 NEW TAPE
: 3
```

81 – 9 – 19.1

VOYAGE RECORDS

INDEX Nº 81-9-19.2
YR. – VOYAGE – TAPE FILE

DATE 5 & 6th November 1981
RECORDING TIME TO GMT
ELAPSED TIME H M S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound
LAT : 73 ° 'N
LONG : 82 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			33	189					
ICE COVER 1Y 2Y+MY TOT	TENTHS			10	T	10				T = Trace
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE Continuing Doppler Calibration
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS
Sampling patterns I1 or B2

No printout available

VOYAGE RECORDS

INDEX Nº 82-9-19.3
YR. – VOYAGE – TAPE FILE

DATE 6th November 1981

RECORDING TIME 18:05 TO 18:14:17 GMT
ELAPSED TIME H 08 M 43 S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound

LAT : 73 ° 'N
LONG : 82 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE					COMMENTS
ICE THICKNESS	CM			33	185				Ramming multi-year flow and clearing rubble from track
ICE COVER 1Y 2Y+MY TOT	TENTHS			10	T	10			
SNOW COVER	CM								
FLEXURAL STRENGTH	KPa								T = Trace
COMPRESSIVE STRENGTH	MPa								
FRICTION									
PRESSURE	MPa								
RIDGES									
CRYSTAL									
SALINITY	%								

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

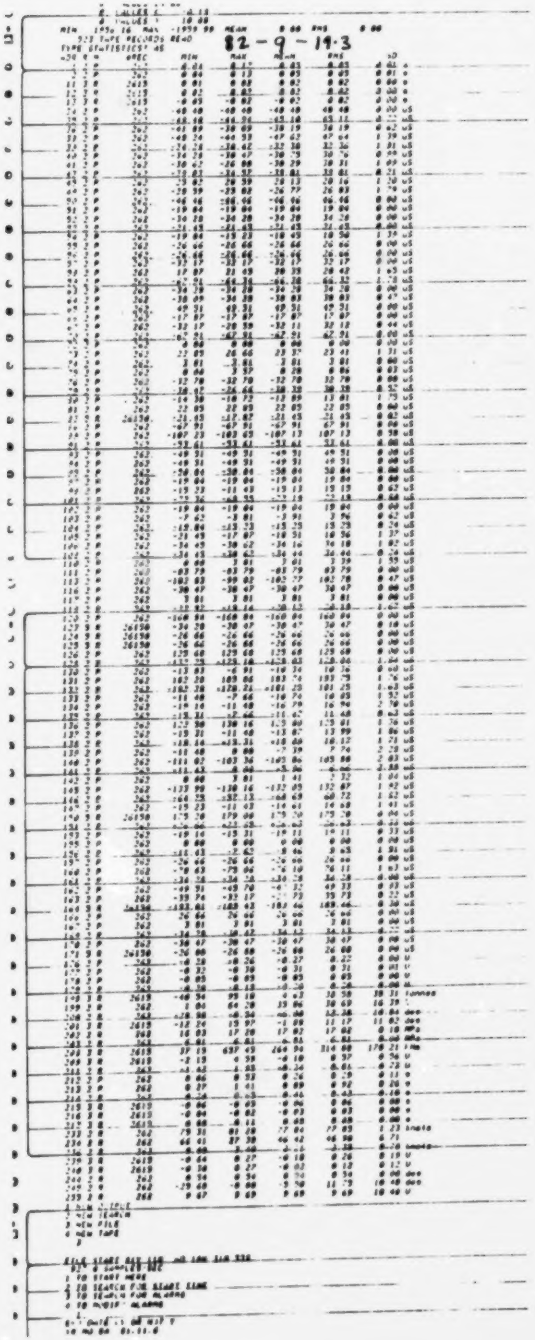
ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS: (SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS
Sampling patters I1 or B2
Printout processed from 18:10:17 to 18:14:17 only



82 - 9 - 19.3

VOYAGE RECORDS

INDEX Nº 81-9-19.4
YR. - VOYAGE - TAPE FILE

DATE 6th November 1981
RECORDING TIME 18:31:55 TO 18:40:55 GMT
ELAPSED TIME 0 H 9 M S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound
LAT : 73 ° 'N
LONG : 82 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE					COMMENTS
ICE THICKNESS	CM			33	189				Backing and ramming in multi-year ice.
ICE COVER 1Y 2Y+MY TOT	TENTHS			10	T	10			
SNOW COVER	CM								T = Trace
FLEXURAL STRENGTH	KPa								
COMPRESSIVE STRENGTH	MPa								
FRICTION									
PRESSURE	MPa								
RIDGES									
CRYSTAL									
SALINITY	%								

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☐

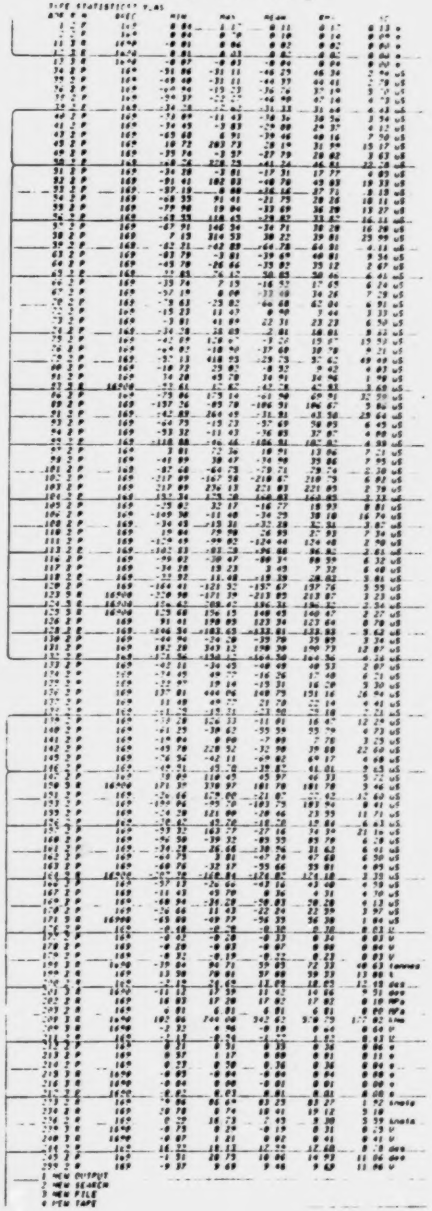
RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS: (SEE APPENDIX A)

VIDEO RECORDING
TAPE Nº: VT3
TIME : TO GMT
PHOTOS =
TO

COMMENTS Sampling patterns I1 or B2
Printout processed from 18:31:55 to 18:34:46 only

81 - 9 - 19.4



VOYAGE RECORDS

INDEX Nº 81-9-19.5
YR. – VOYAGE – TAPE FILE

DATE 6th November 1981
RECORDING TIME 18:49:51 TO GMT
ELAPSED TIME H M S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound
LAT : 73 ° 'N
LONG : 82 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM			33 189	Ramming and backing multi-year ice some rubble
ICE COVER 1Y 2Y+MY TOT	TENTHS			10 T 10	
SNOW COVER	CM				T = Trace
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☐

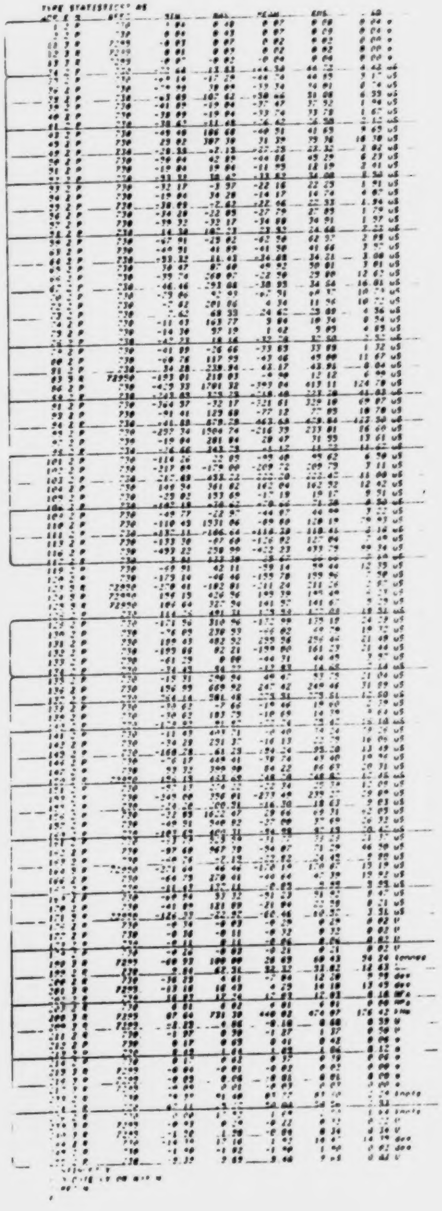
RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT3
TIME : TO GMT
PHOTOS =
TO

COMMENTS Sampling patterns I1 or B2
printout processed from 18:49:51 to 19:02:00 only

81- 9 - 19·5



VOYAGE RECORDS

INDEX Nº
81-9-19.6
YR.-VOYAGE-TAPE FILE

DATE 6th November 1981
RECORDING TIME 19:10:50 TO 19:31:10 GMT
ELAPSED TIME H 16 M 10 S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound
LAT : 73 ° 'N
LONG : 82 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			20	185	20				
ICE COVER (IY / 2Y+MY / TOT)	TENTHS			9	1	10				
SNOW COVER	CM			5						
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☐

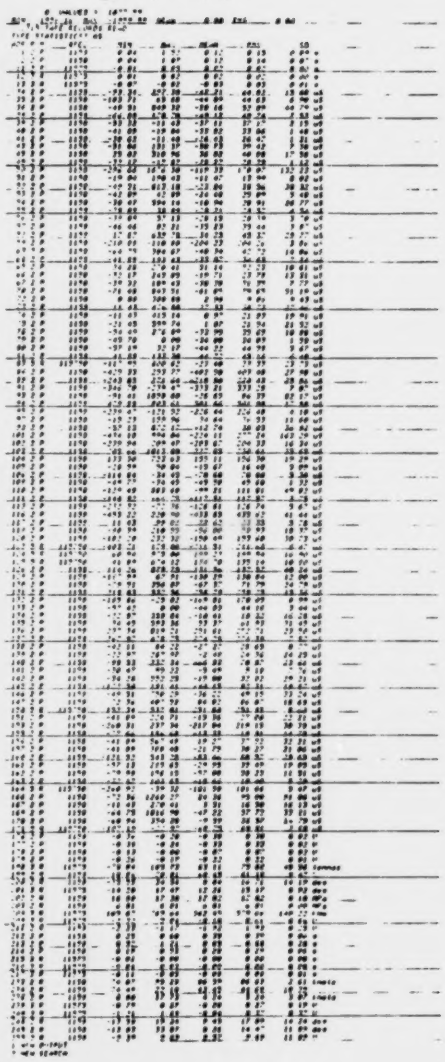
RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT3
TIME : TO GMT
PHOTOS =
TO

COMMENTS Sampling patternsn I1 or B2
Printout processed from 19:10:17 to 19:29:18 only

81- 9 - 19·6



VOYAGE RECORDS

INDEX Nº 81-9-20.1
YR.-VOYAGE-TAPE FILE

DATE 6th November 1981

RECORDING TIME 19:33:01 TO 19:50:21 GMT
ELAPSED TIME H 17 M 20 S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound

LAT : 73 ° 'N
LONG : 82 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE			COMMENTS
ICE THICKNESS	CM			20	185		1st year this ice some multi year and loose pack
ICE COVER 1Y 2Y+MY TOT	TENTHS			9	1	10	
SNOW COVER	CM						
FLEXURAL STRENGTH	KPa						
COMPRESSIVE STRENGTH	MPa						
FRICTION							
PRESSURE	MPa						
RIDGES							
CRYSTAL							
SALINITY	%						

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

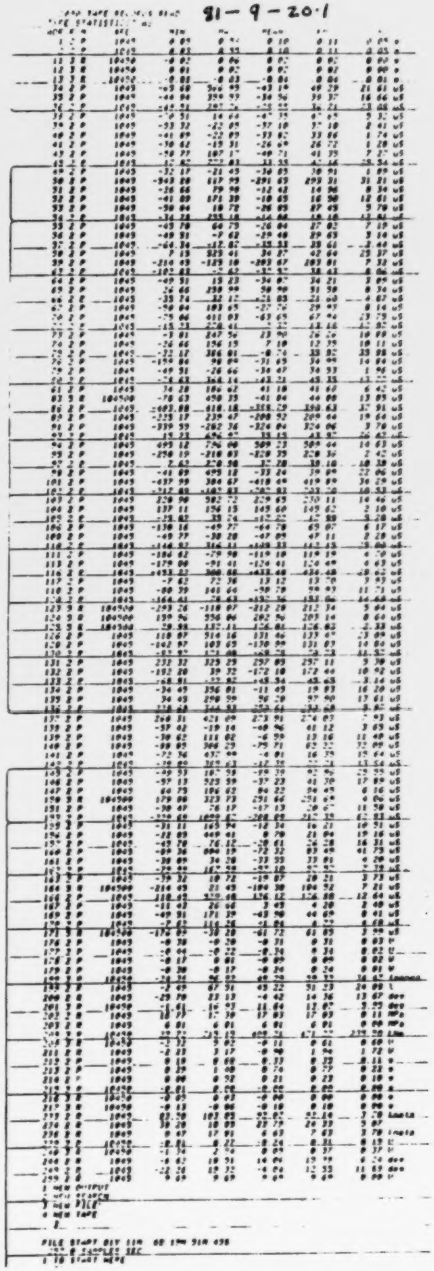
RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT3
TIME : TO GMT
PHOTOS =
TO

COMMENTS Sampling pattern C1

81-9-20.1



VOYAGE RECORDS

INDEX Nº 81-9-20.2
YR.-VOYAGE-TAPE FILE

DATE 6th November 1981

RECORDING TIME 19:51 TO 20:47:30 GMT

ELAPSED TIME H 56 M 30 S

CONTRACTOR: Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound

LAT: 73 ° 'N

LONG: 82 ° 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M

AFT: M

CARGO ☐

BALLAST ☒

BUBBLER ON ☐ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			20	185					Some multi year rubble pushed around
ICE COVER 1Y 2Y+MY TOT	TENTHS			9	1	10				
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒

NAME CCGS Louis St. Laurent

FOLLOWING ☐

IN ATTENDANCE ☒

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐

INTERVAL= SECS

TAPE INFO HEADER ☐

EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

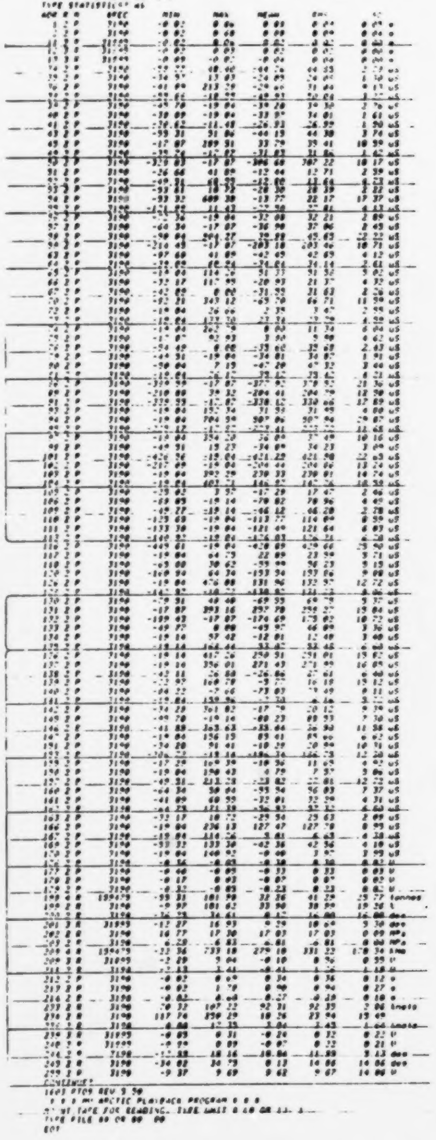
VIDEO RECORDING TAPE Nº: VT3

TIME: TO GMT

PHOTOS =
TO

COMMENTS Sampling pattern C1
Printouts processed from 19:51:51 to 20:45:00 only

81 - 9 - 20·2



VOYAGE RECORDS

INDEX Nº 81-9-20.3
YR. - VOYAGE - TAPE FILE

DATE 6th November 1981
RECORDING TIME 20:47:30 TO 20:51:36 GMT
ELAPSED TIME 0 H 4 M 6 S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound
LAT : 73 ° 'N
LONG : 82 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD! M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE				COMMENTS
ICE THICKNESS	CM			20	185			
ICE COVER (IY / 2Y+MY / TOT)	TENTHS			9	1	10		
SNOW COVER	CM							
FLEXURAL STRENGTH	KPa							open leads
COMPRESSIVE STRENGTH	MPa							
FRICTION								
PRESSURE	MPa							
RIDGES								
CRYSTAL SALINITY	%							

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT3
TIME : TO GMT
PHOTOS =
TO

COMMENTS Sampling patterns C1

No printout available

VOYAGE RECORDS

INDEX Nº 81-9-20.4
YR. – VOYAGE – TAPE FILE

DATE 6th November 1981

RECORDING TIME 20:54:30 TO 21:30:36 GMT

ELAPSED TIME H 36 M 6 S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound

LAT : 73 ° 'N

LONG : 82 ° 30 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M CARGO ☐ BUBBLER ON ☐

AFT: M BALLAST ☒ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			20	185					
ICE COVER 1Y / 2Y+MY / TOT	TENTHS			9	1	10				Following lead
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒

NAME CCGS Louis St. Laurent

FOLLOWING ☐

IN ATTENDANCE ☒

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐

INTERVAL= SECS

TAPE INFO HEADER ☐

EOF ☐

OMIT CHANNELS: (SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT3

TIME : TO GMT

PHOTOS =

# TO

COMMENTS Sampling pattern C1

No printout available

VOYAGE RECORDS

INDEX Nº 81-9-21.1
YR.–VOYAGE–TAPE FILE

DATE 6th November 1981
RECORDING TIME 21:31:50 TO 21:55:56 GMT
ELAPSED TIME 00 H 24 M 06 S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound
LAT : 73 ° 'N
LONG : 82 ° 30 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M AFT: M
CARGO ☐ BALLAST ☒
BUBBLER ON ☐ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				
ICE COVER IY 2Y+MY TOT	TENTHS			T	T = Trace
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				Loose pack ice pushing a multi-year flow
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT3
TIME : 20:47:30 TO 21:55:56 GMT
PHOTOS =
TO

COMMENTS Sampling pattern Cl

No printout available

VOYAGE RECORDS

INDEX Nº 81-9-22.1
YR. – VOYAGE – TAPE FILE

DATE 7th November 1981

RECORDING TIME 14:42:12 TO 15:08:14 GMT

ELAPSED TIME H 26 M 02 S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound

LAT : 73 ° 52 'N

LONG : 82 ° 40 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M

AFT: M

CARGO ☐

BALLAST ☒

BUBBLER ON ☒

OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	RANGE	COMMENTS
ICE THICKNESS	CM			20	488	
ICE COVER 1Y 2Y+MY TOT	TENTHS			2		
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						Backing and ramming
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒

NAME CCGS Louis St. Laurent

FOLLOWING ☐

IN ATTENDANCE ☒

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐

INTERVAL= SECS

TAPE INFO HEADER ☐

EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT3

TIME : TO GMT

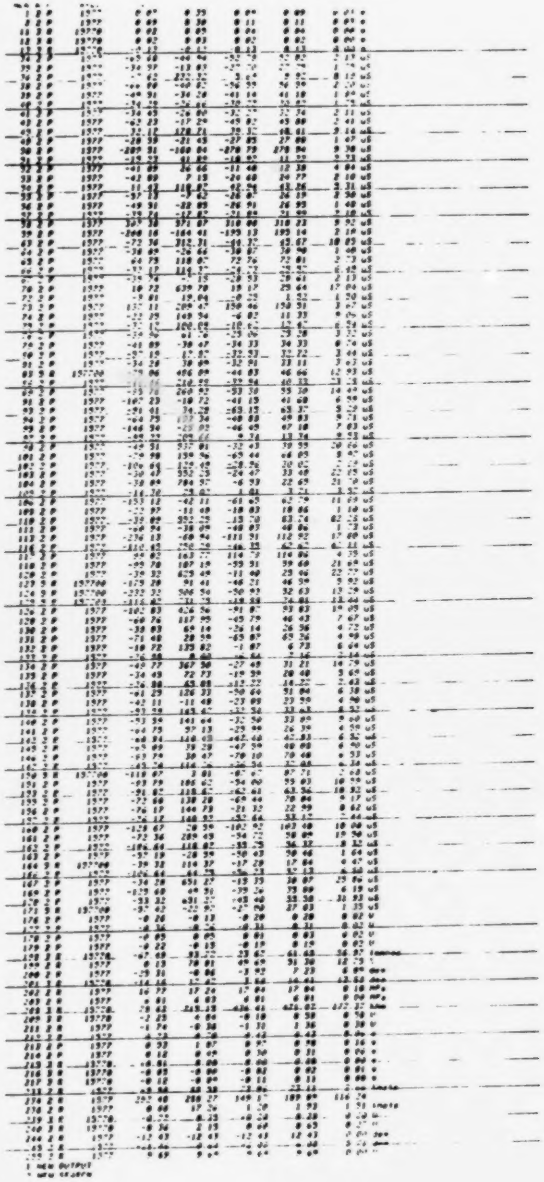
PHOTOS =

TO

COMMENTS

Sampling pattern B2

81 – 9 – 22.1



VOYAGE RECORDS

INDEX Nº 81-9-22.2
YR. - VOYAGE - TAPE FILE

DATE 7th November 1981

RECORDING TIME 15:17 TO 15:24 GMT
ELAPSED TIME H 07 M S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound

LAT : 73 ° 52 'N
LONG : 82 ° 40 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☐ BUBBLER ON ☒
AFT: M BALLAST ☒ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				
ICE COVER (IY / 2Y+MY / TOT)	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				Following lead backing and ramming
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT3
TIME : TO GMT
PHOTOS =
TO

COMMENTS Sampling pattern B2

No printout available

VOYAGE RECORDS

INDEX Nº 81-9-22.3
YR. - VOYAGE - TAPE FILE

DATE 7th November 1981
RECORDING TIME 15:25 TO 15:34 GMT
ELAPSED TIME H M S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound
LAT : 73 ° 52 'N
LONG : 82 ° 40 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				Varying ice conditions from open water, loose pack, multi-year flows and continuous breaking
ICE COVER 1Y 2Y+MY TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	*
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT3
TIME : TO GMT
PHOTOS =
TO

COMMENTS Sampling pattern B2

No printout available

VOYAGE RECORDS

INDEX Nº 81-9-22.4
YR.-VOYAGE-TAPE FILE

DATE	7th November 1981
RECORDING TIME	15:36:42 TO 16:10:14 GMT
ELAPSED TIME	H 33 M 32 S
CONTRACTOR :	Arctec Canada Limited
FINAL REPORT Nº	3634 TP
LOCATION	Lancaster Sound
LAT :	73 ° 52 'N
LONG :	82 ° 40 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☐ BUBBLER ON ☐
AFT: M BALLAST ☒ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM			15	20	Direct hit on multi-year flow - 16:05
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS			5 / 2 / 7		
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

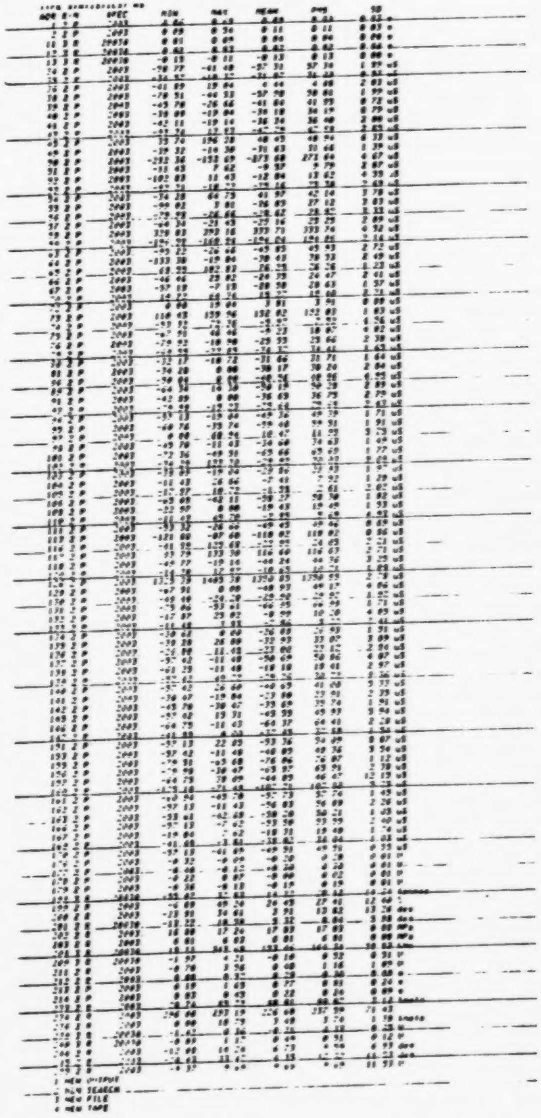
RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS: (SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT3 PHOTOS =
TIME : TO GMT # TO

COMMENTS Sampling pattern C1

81 - 9 - 22·4



VOYAGE RECORDS

INDEX Nº 81-9-22.5
YR. – VOYAGE – TAPE FILE

DATE 7th November 1981
RECORDING TIME 16:10 TO 16:35 GMT
ELAPSED TIME H 25 M S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound
LAT : 73 ° 52 'N
LONG : 82 ° 40 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM			20	488	
ICE COVER IY 2Y+MY TOT	TENTHS				T	T = Trace
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					Backing and ramming
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

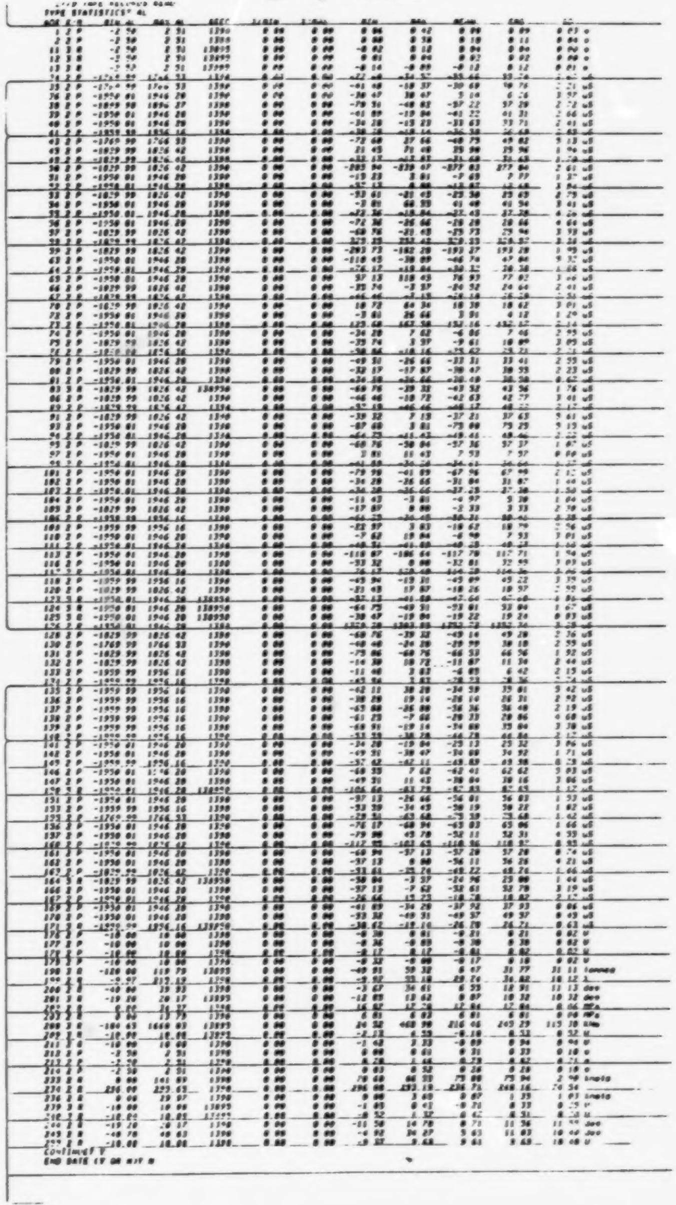
RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT3
TIME : TO GMT
PHOTOS =
TO

COMMENTS
Sampling pattern B2

81-9-22.5



VOYAGE RECORDS

INDEX Nº 81-9-23.1
YR.–VOYAGE–TAPE FILE

DATE 7th November 1981
RECORDING TIME 16:38 TO 17:00:17 GMT
ELAPSED TIME H 38 M 17 S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound
LAT : 73 ° 52 'N
LONG : 82 ° 40 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				
ICE COVER 1Y | 2Y+MY | TOT	TENTHS			T	Multi-year floe
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				T = Trace
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT3
TIME : TO GMT
PHOTOS =
TO

COMMENTS Sampling pattern B2
Printout processed from 16:38:53 to 16:55:00 only

81 - 9 - 23.1

VOYAGE RECORDS

INDEX Nº 81-9-24.1
YR. – VOYAGE – TAPE FILE

DATE 7th November 1981
RECORDING TIME 17:06:00 TO 17:12:09 GMT
ELAPSED TIME H 06 M 09 S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound
LAT : 73 ° 52 'N
LONG : 82 ° 40 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			21	25			610	–	Backing and ramming
ICE COVER 1Y 2Y+MY TOT	TENTHS			10		10		T		
SNOW COVER	CM									T = Trace
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

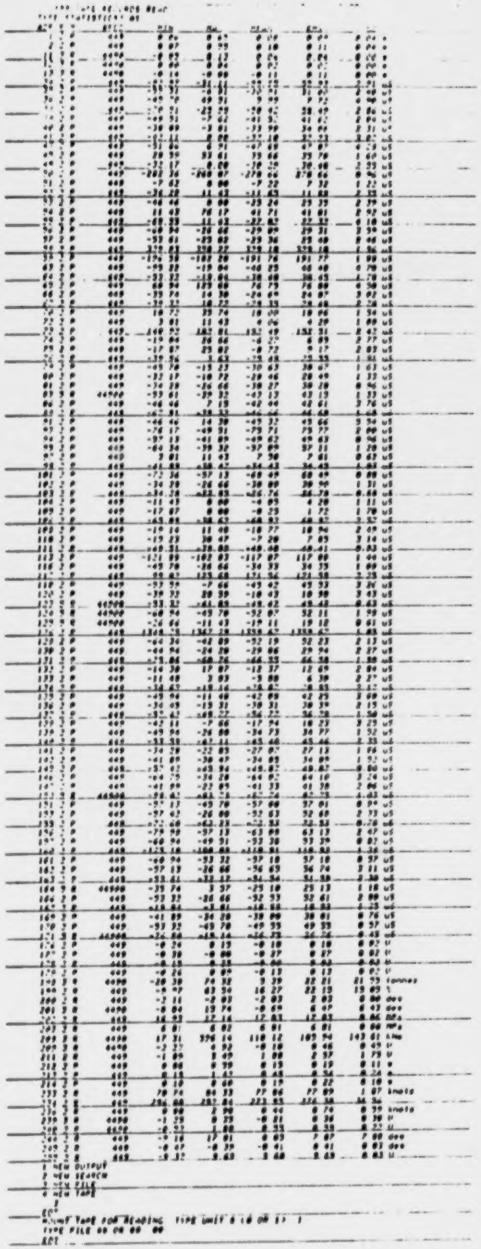
RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS
Sampling patterns B2 or F

81- 9 - 24.1



VOYAGE RECORDS

INDEX Nº 81-9-24.2
YR. – VOYAGE – TAPE FILE

DATE 7th November 1981
RECORDING TIME 17:20:39 TO 18:51 GMT
ELAPSED TIME 1 H 30 M 21 S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound
LAT : 73 ° 52 'N
LONG : 82 ° 40 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM			21	610	Backing and ramming some multi-year pieces
ICE COVER 1Y 2Y+MY TOT	TENTHS					
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING			*	
ASTERN	*			
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

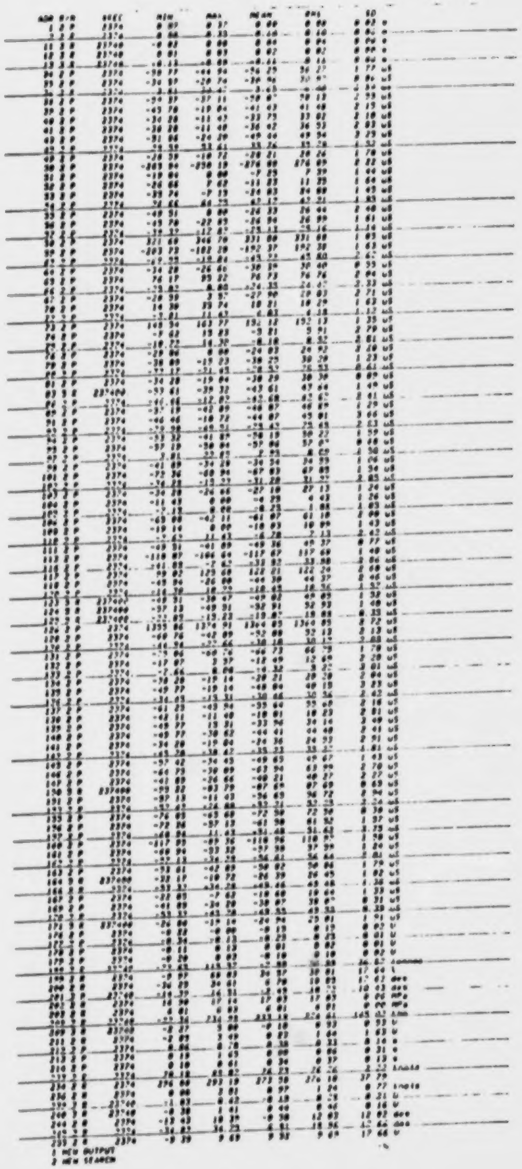
RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT3
TIME : TO GMT
PHOTOS =
TO

COMMENTS Sampling patterns B2 or F
Printout processed from 17:19:52 to 17:59:12 only

81-9-24.2



VOYAGE RECORDS

INDEX Nº 81-9-25.1
YR. – VOYAGE – TAPE FILE

DATE 7th November 1981
RECORDING TIME 20:09 TO 20:16:50 GMT
ELAPSED TIME H 7 M 50 S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Approaching Admiralty Inlet
LAT : 73 ° 52 'N
LONG : 82 ° 40 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD! M CARGO ☐ BUBBLER ON ☐
AFT: M BALLAST ☒ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM			30	
ICE COVER 1Y 2Y+MY TOT	TENTHS			10 T 10	T = Trace
SNOW COVER	CM			4.0	
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT3 PHOTOS =
TIME : TO GMT # TO

COMMENTS Sampling pattern F

No printout available

VOYAGE RECORDS

INDEX Nº 81-9-25.2
YR. – VOYAGE – TAPE FILE

DATE 7th November 1981 RECORDING TIME TO GMT
ELAPSED TIME H M S

CONTRACTOR : Arctec Canada Limited FINAL REPORT Nº 3634 TP

LOCATION Approaching Admiralty Inlet LAT : 73 ° 52 'N
LONG : 82 ° 40 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☐ BUBBLER ON ☐
AFT: M BALLAST ☒ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM			30	
ICE COVER 1Y 2Y+MY TOT	TENTHS			10 T 10	loose 1st year pack
SNOW COVER	CM			4	T = Trace
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.1

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☒
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS Sampling pattern F

No printout available

VOYAGE RECORDS

INDEX Nº
81-9-25.3
YR. – VOYAGE – TAPE FILE

DATE 7th November 1981
RECORDING TIME 20:27:15 TO 20:40 GMT
ELAPSED TIME H 12 M 45 S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Approaching Admiralty Inlet
LAT : 73 ° 52 'N
LONG : 82 ° 40 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM			30		Some loose pack ice
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS			10	10	
SNOW COVER	CM			4.0		
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS Sampling pattern F

No printout available

VOYAGE RECORDS

INDEX Nº 81-9-25.4
YR. – VOYAGE – TAPE FILE

DATE 7th November 1981
RECORDING TIME 20:55 TO 21:22 GMT
ELAPSED TIME H 27 M S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Approaching Admiralty Inlet
LAT : 73 ° 52 'N
LONG : 82 ° 40 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM			30	
ICE COVER 1Y / 2Y+MY / TOT	TENTHS			10 10	
SNOW COVER	CM			4	
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT3
TIME : TO GMT
PHOTOS =
TO

COMMENTS Sampling pattern F

No printout available

VOYAGE RECORDS

INDEX Nº 81-9-25.5
YR. – VOYAGE – TAPE FILE

DATE 7th November 1981
RECORDING TIME 21:13 TO GMT
ELAPSED TIME H M S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Approaching Admiralty Inlet
LAT : 73 ° 52 'N
LONG : 82 ° 40 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD! M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM			30	
ICE COVER 1Y 2Y+MY TOT	TENTHS			10 10	
SNOW COVER	CM			4	
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS Sampling pattern F

No printout available

VOYAGE RECORDS

INDEX Nº 81-9-25.6
YR.—VOYAGE—TAPE FILE

DATE 7th November 1981 RECORDING TIME 21:22 TO GMT
ELAPSED TIME H M S

CONTRACTOR: Arctec Canada Limited FINAL REPORT Nº 3634 TP

LOCATION Approaching Admiralty Inlet LAT: 73 ° 52 'N LONG: 82 ° 40 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☐ BUBBLER ON ☐
AFT: M BALLAST ☒ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM			30		
ICE COVER (IY / 2Y+MY / TOT)	TENTHS			10	10	
SNOW COVER	CM			4		
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐ INTERVAL= . SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME: TO GMT
PHOTOS =
TO

COMMENTS Sampling pattern F

No printout available

VOYAGE RECORDS

INDEX Nº
81-9-26.1
YR. - VOYAGE - TAPE FILE

DATE 8th November 1981

RECORDING TIME 14:10:53 TO 16:01:02 GMT

ELAPSED TIME 01 H 50 M 09 S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Mouth of Admiralty Inlet

LAT : 73 ° 20 'N

LONG : 84 ° 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M CARGO ☐ BUBBLER ON ☐

AFT: M BALLAST ☒ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE			COMMENTS
ICE THICKNESS	CM			22			
ICE COVER (IY / 2Y+MY / TOT)	TENTHS			6	2	8	
SNOW COVER	CM		*	13			
FLEXURAL STRENGTH	KPa						
COMPRESSIVE STRENGTH	MPa						
FRICTION							
PRESSURE	MPa						
RIDGES							
CRYSTAL							
SALINITY	%						

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒

NAME CCGS Louis St. Laurent

FOLLOWING ☐

IN ATTENDANCE ☒

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐ INTERVAL= SECS

TAPE INFO HEADER ☐ EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

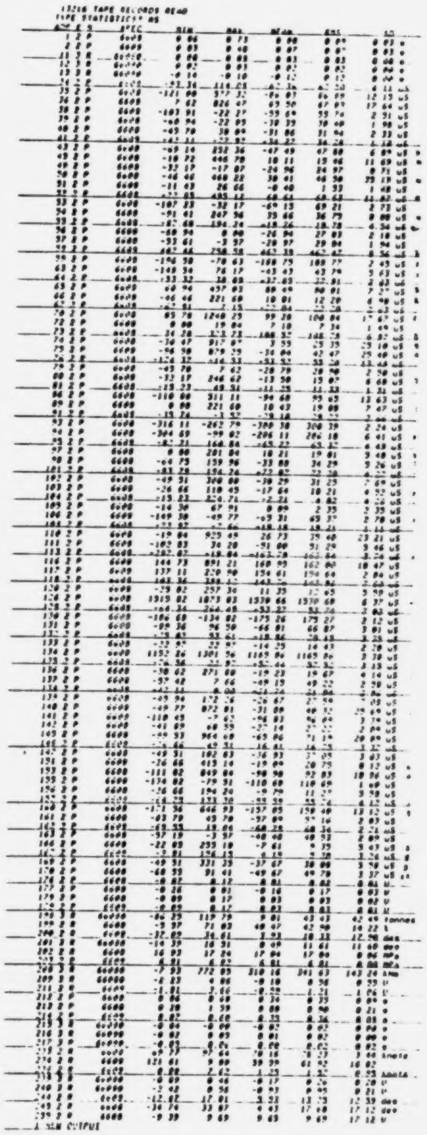
VIDEO RECORDING TAPE Nº: VT4

TIME : 14:12 TO 16:01 GMT

PHOTOS =
TO

COMMENTS Sampling pattern C2

81-9-26.1



VOYAGE RECORDS

INDEX Nº 81-9-26.2
YR. – VOYAGE – TAPE FILE

DATE 8th November 1981
RECORDING TIME 16:29:20 TO 17:39:54 GMT
ELAPSED TIME 01 H 09 M 34 S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Mouth of Admiralty Inlet
LAT : 73 ° 20 'N
LONG : 84 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM			20	loose pack ice
ICE COVER 1Y 2Y+MY TOT	TENTHS			10 T 10	T = Trace
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

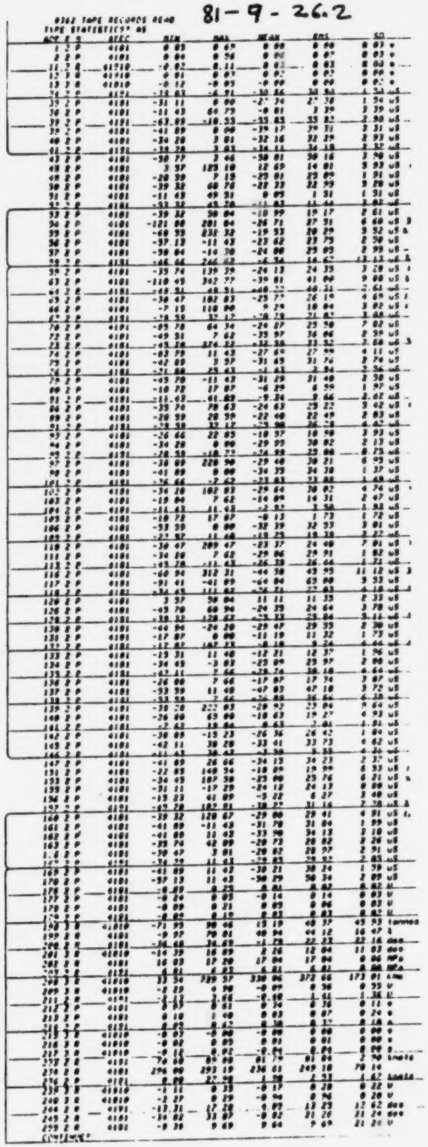
RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS: (SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT4
TIME : 10:29 TO GMT
PHOTOS =
TO

COMMENTS Sampling pattern C2
Printout processed from 16:29:20 to 17:39:00 only

81-9-26.2



VOYAGE RECORDS

INDEX Nº
81-9-27.1
YR. – VOYAGE – TAPE FILE

DATE 8th November 1981
RECORDING TIME 18:55 TO 20:12 GMT
ELAPSED TIME 01 H 17 M 50 S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Mouth of Admiralty Inlet
LAT : 73 ° 20 'N
LONG : 84 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☐
BALLAST ☒
BUBBLER ON ☒
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM						30			
ICE COVER: IY / 2Y+MY / TOT	TENTHS			8	2	10				
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									Ship speed = 8 knots

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

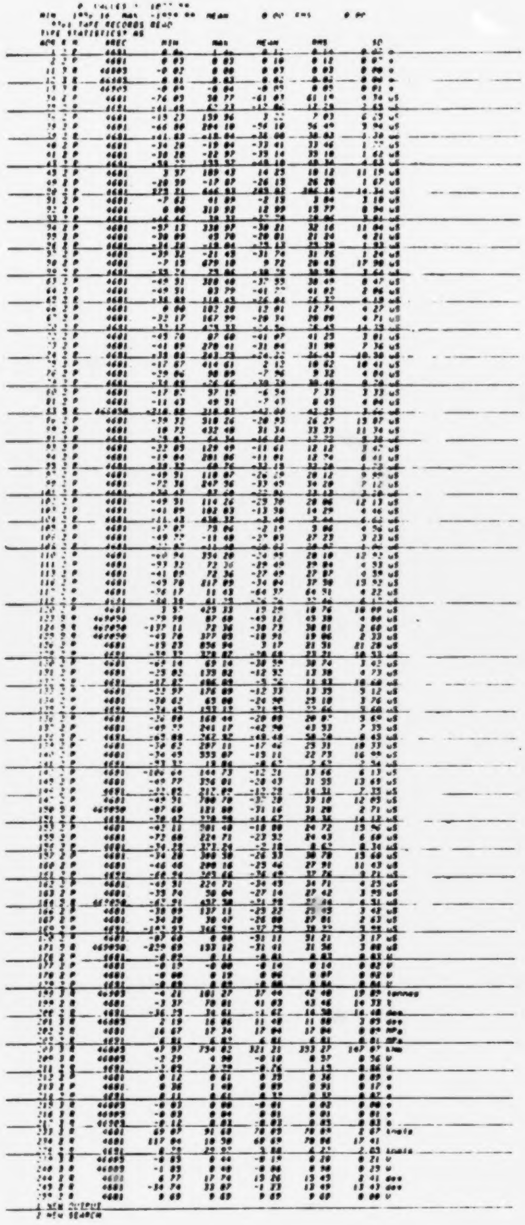
RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT4
TIME : 18:55 TO 20:12 GMT
PHOTOS =
TO

COMMENTS
Sampling pattern B3
Printout processed from 18:55:11 to 20:12:51 only

81-9-27.1



VOYAGE RECORDS

INDEX Nº
81-9-28.1
YR.-VOYAGE-TAPE FILE

DATE 8th November 1981 RECORDING TIME 20:20:22 TO 21:08 GMT
ELAPSED TIME 00 H 47 M 40 S

CONTRACTOR : Arctec Canada Limited FINAL REPORT Nº 3634 TP

LOCATION Admiralty Inlet LAT : 73 ° 20 'N
LONG : 84 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☐ BUBBLER ON ☐
AFT: M BALLAST ☒ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM			30	Loose pack with large floes
ICE COVER 1Y 2Y+MY TOT	TENTHS			4 4 8	
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

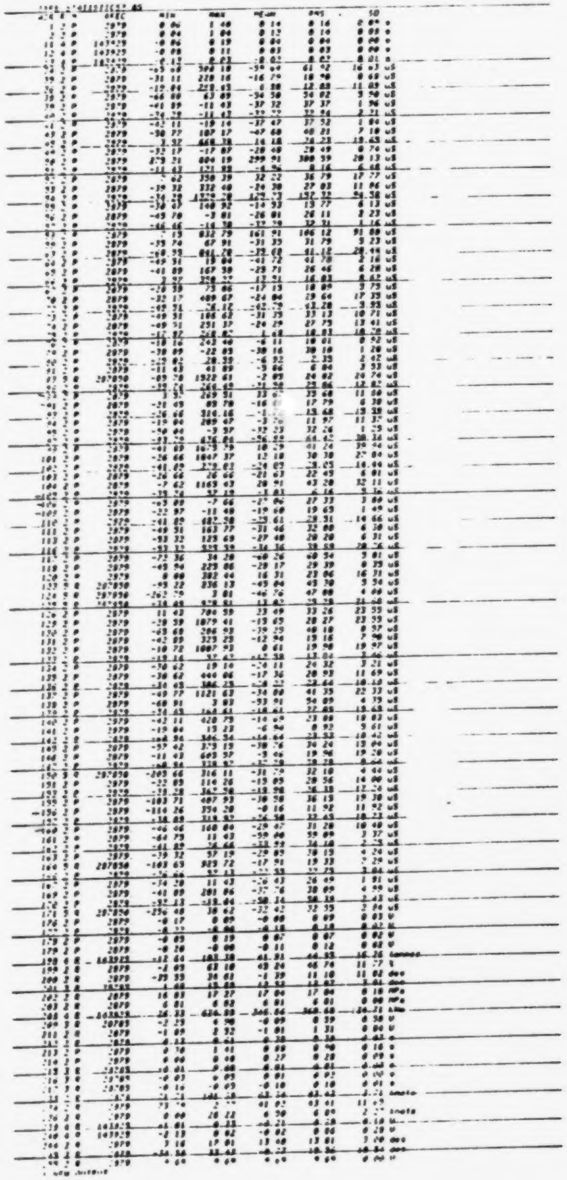
RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT4
TIME : 20:12 TO 21:34 GMT

PHOTOS =
TO

COMMENTS
Sampling pattern B3
Printout processed from 20:20:31 to 21:08:29 only

81- 9-28.1



VOYAGE RECORDS	INDEX Nº 81-9-28.2 YR.-VOYAGE-TAPE FILE

DATE 8th November 1981 RECORDING TIME 21:02 TO GMT

ELAPSED TIME H M S

CONTRACTOR: Arctec Canada Limited FINAL REPORT Nº 3634 TP

LOCATION Admiralty Inlet LAT: 73 ° 20 'N LONG: 84 ° 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M CARGO ☐ BUBBLER ON ☐

AFT: M BALLAST ☒ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE				COMMENTS
ICE THICKNESS	CM						30	loose pack 1st and 2nd year
ICE COVER 1Y 2Y+MY TOT	TENTHS			4	4	8		
SNOW COVER	CM							
FLEXURAL STRENGTH	KPa							
COMPRESSIVE STRENGTH	MPa							
FRICTION								
PRESSURE	MPa							
RIDGES								
CRYSTAL								
SALINITY	%							

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒

NAME CCGS Louis St. Laurent

FOLLOWING ☐

IN ATTENDANCE ☒

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐ INTERVAL= SECS

TAPE INFO HEADER ☐ EOF ☐

OMIT CHANNELS: (SEE APPENDIX A)

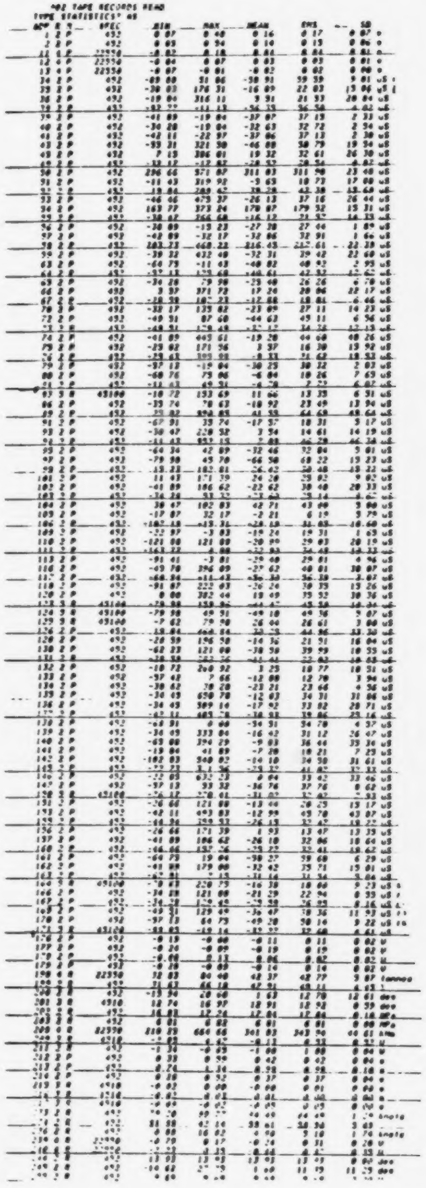
VIDEO RECORDING TAPE Nº: PHOTOS =

TIME: TO GMT # TO

COMMENTS

Sampling pattern B3
Printout processed from 21:08:30 to 21:16:01 only

81-9- 28.2



VOYAGE RECORDS

INDEX Nº 81-9-29.1
YR. – VOYAGE – TAPE FILE

DATE 8th November 1981

RECORDING TIME 21:34 TO 21:36:42 GMT
ELAPSED TIME H M S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Admiralty Inlet

LAT : 73 ° 20 'N
LONG : 84 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☐ BUBBLER ON ☐
AFT: M BALLAST ☒ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM				30	
ICE COVER IY | 2Y+MY | TOT	TENTHS			6	6	1st year loose pack
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT4
TIME : TO GMT
PHOTOS =
TO

COMMENTS Sampling patterns G1 or H

No printout available

VOYAGE RECORDS

INDEX Nº
81-9-29.2
YR. - VOYAGE - TAPE FILE

DATE November 8th, 1981 RECORDING TIME 21:37:43 TO 22:04:05 GMT
ELAPSED TIME 00 H 26 M 22 S

CONTRACTOR: Arctec Canada Limited FINAL REPORT Nº 3634 TP

LOCATION Admiralty Inlet LAT: 73 ° 20 'N LONG: 84 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☐ BUBBLER ON ☐
AFT: M BALLAST ☒ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM			30	61	
ICE COVER 1Y 2Y+MY TOT	TENTHS			10	10	
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME C C G S Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

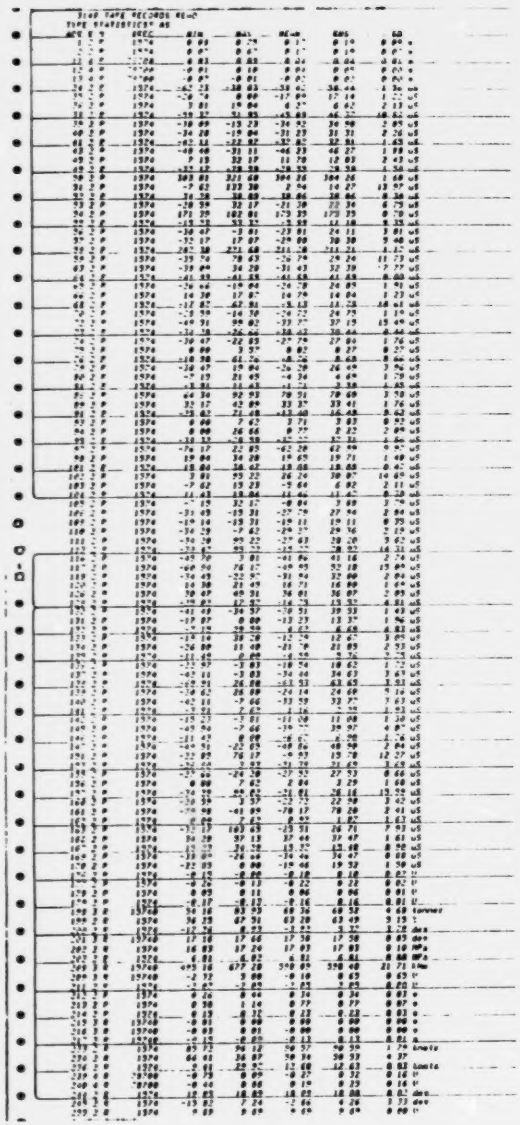
RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME: TO VT 4 GMT
PHOTOS =
TO

COMMENTS
Sampling patterns Gl or H

81-9- 29.2



VOYAGE RECORDS

INDEX Nº
81-9-29.3
YR.–VOYAGE–TAPE FILE

DATE 8th November 1981

RECORDING TIME 22:42 TO GMT

ELAPSED TIME H M S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Admiralty Inlet

LAT : 73 ° 20 'N

LONG : 84 ° 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M

AFT: M

CARGO ☐

BALLAST ☒

BUBBLER ON ☐

OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM			30	61	
ICE COVER [1Y] [2Y+MY] [TOT]	TENTHS			10	10	
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒

NAME CCGS Louis St. Laurent

FOLLOWING ☐

IN ATTENDANCE ☒

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐

INTERVAL= SECS

TAPE INFO HEADER ☐

EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT4

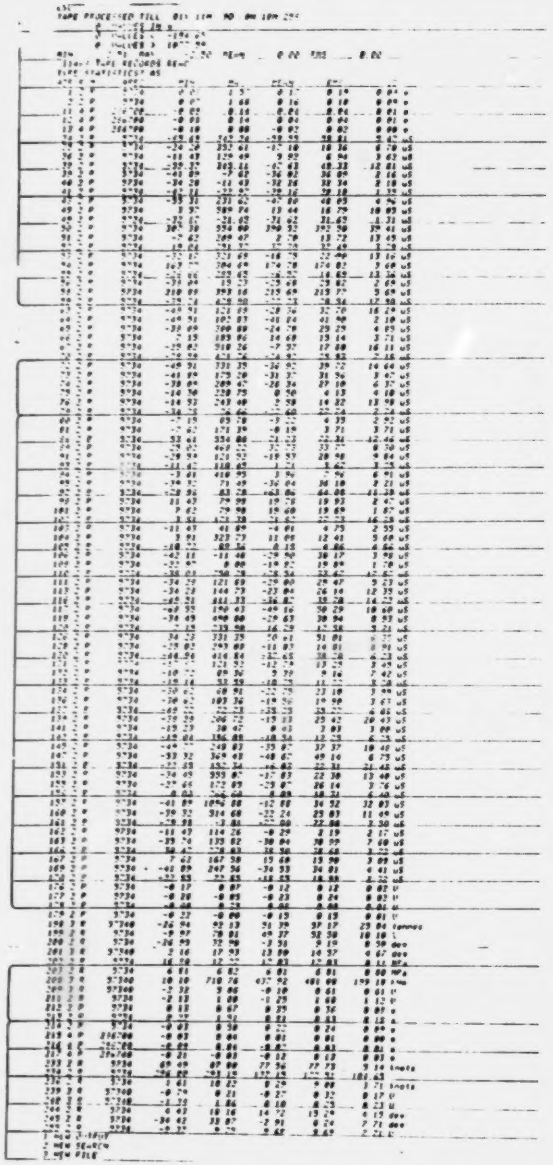
TIME : TO GMT

PHOTOS =

# TO

COMMENTS Sampling patterns G1 or H
Printout processed from 22:42:51 to 0:18:25 only

81-9-29.3



VOYAGE RECORDS

INDEX Nº 81-9-30.1
YR. – VOYAGE – TAPE FILE

DATE 9th November 1981
RECORDING TIME 04:02 TO GMT
ELAPSED TIME H M S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Nanisivik dock
LAT : 73 ° 15 'N
LONG : 85 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☐ BUBBLER ON ☐
AFT: M BALLAST ☒ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				
ICE COVER 1Y 2Y+MY TOT	TENTHS				Docking
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING			*	

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:
See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS Sampling pattern C2

No printout available

VOYAGE RECORDS

INDEX Nº 81-10-31.1
YR.-VOYAGE-TAPE FILE

DATE 11th November 1981
RECORDING TIME 20:52:30 TO 23:26 GMT
ELAPSED TIME 2 H 34 M S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Strathcona Sound
LAT : 73 ° 15 'N
LONG : 85 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☒ BUBBLER ON ☒
AFT: M BALLAST ☐ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM					
ICE COVER IY 2Y+MY TOT	TENTHS			9	9	1st year ice
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					Ship's speed = 9 knots

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT4
TIME : 20:52 TO 23:41 GMT
PHOTOS =
TO

COMMENTS Sampling pattern C2

No printout available

VOYAGE RECORDS

INDEX Nº 81-10-32.1
YR.-VOYAGE-TAPE FILE

DATE 11 & 12th November 1981
RECORDING TIME 23:41:31 TO 02:19:25 GMT
ELAPSED TIME 02 H 37 M 54 S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Admiralty Inlet
LAT : 73 ° 20 'N
LONG : 84 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☒ BUBBLER ON ☒
AFT: M BALLAST ☐ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				First year ice with ridging. Some multi-year impacts. T = Trace
ICE COVER 1Y 2Y+MY TOT	TENTHS			9 T 9	
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

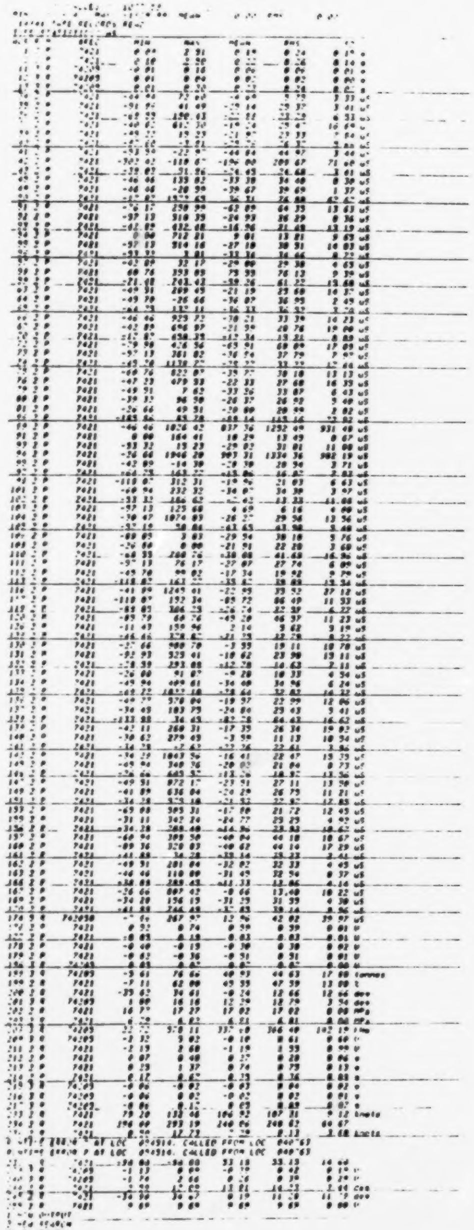
RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT4
TIME : 23:41 TO 01:05 GMT
PHOTOS =
TO

COMMENTS Sampling pattern C2
Printout processed from 23:41:31 to 01:44:52 only

81 - 10 - 32.1



VOYAGE RECORDS

INDEX Nº
81-10-33.1
YR.-VOYAGE-TAPE FILE

DATE 12th November 1981

RECORDING TIME 02:58:57 TO 05:39 GMT

ELAPSED TIME H M S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound LAT : 74 ° 'N LONG : 84 ° 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M CARGO ☒ BUBBLER ON ☒

AFT: M BALLAST ☐ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			10	121		60	182		
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS			7	3	10				
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒

NAME CCGS Louis St. Laurent

FOLLOWING ☒

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐ INTERVAL= SECS

TAPE INFO HEADER ☐ EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT4

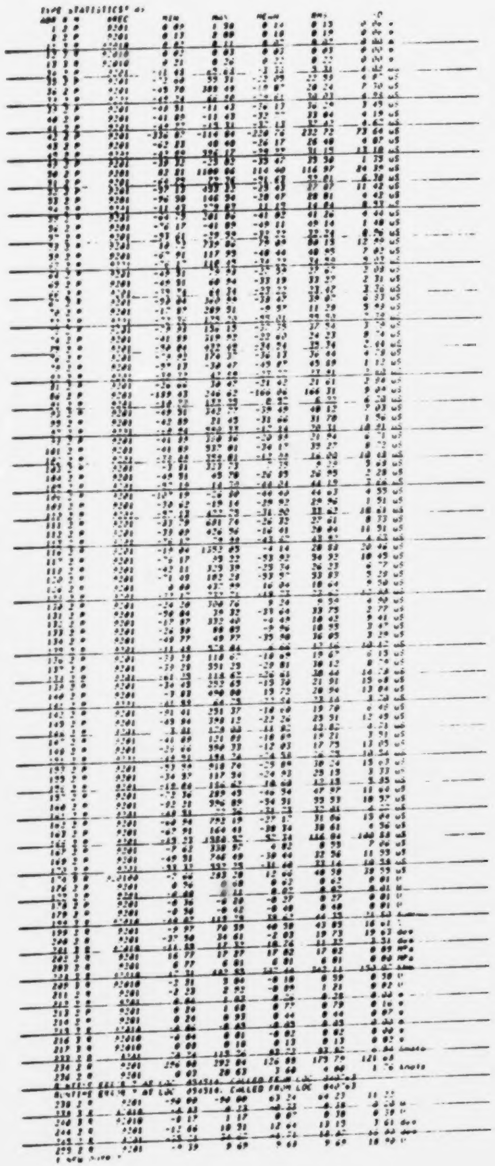
TIME : 02:58 TO GMT

PHOTOS =
TO

COMMENTS

Sampling pattern C3
Printout processed from 02:58:55 to 05:32:17 only

81- 10- 33.1



VOYAGE RECORDS

INDEX Nº 81-10-34.1
YR. – VOYAGE – TAPE FILE

DATE 12th November 1981
RECORDING TIME 05:40 TO 08:31 GMT
ELAPSED TIME 02 H 51 M S

CONTRACTOR: Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound
LAT: 74 ° 'N
LONG: 84 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☒
BALLAST ☐
BUBBLER ON ☒
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			10	121		60	182		Multi-year impacts
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS			7	3	10				
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT4
TIME: 04:20 TO 08:31 GMT
PHOTOS =
TO

COMMENTS Sampling patterns B4 or C3

No printout available

VOYAGE RECORDS

INDEX Nº
81-10-35.1
YR. – VOYAGE – TAPE FILE

DATE 12th November 1981 RECORDING TIME 08:35 TO 11:16 GMT

ELAPSED TIME 02 H 41 M S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound LAT : 74 ° 'N LONG : 84 ° 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M CARGO ☒ BUBBLER ON ☒

AFT: M BALLAST ☐ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			10	121		60	182		
ICE COVER 1Y 2Y+MY TOT	TENTHS			7	3	10				
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒

NAME CCGS Louis St. Laurent

FOLLOWING ☒

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐ INTERVAL= SECS

TAPE INFO HEADER ☐ EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT4

TIME : TO GMT

PHOTOS =
TO

COMMENTS Sampling patterns B4 or C3

No printout available

VOYAGE RECORDS

INDEX Nº 81-10-36.1
YR. - VOYAGE - TAPE FILE

DATE 12th November 1981

RECORDING TIME 12:05:12 TO 13:46:27 GMT

ELAPSED TIME 01 H 41 M 15 S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound

LAT : 74 ° 'N

LONG : 84 ° 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M

AFT: M

CARGO ☒

BALLAST ☐

BUBBLER ON ☒

OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE					COMMENTS
ICE THICKNESS	CM			10	120		60	182	Ice milling through the propeller multi-year ice
ICE COVER 1Y / 2Y+MY / TOT	TENTHS			7	3	10			
SNOW COVER	CM								
FLEXURAL STRENGTH	KPa								
COMPRESSIVE STRENGTH	MPa								
FRICTION									
PRESSURE	MPa								
RIDGES									
CRYSTAL									
SALINITY	%								

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN	*			
TURNING				

ICEBREAKER SUPPORT ☒

NAME CCGS Louis St. Laurent

FOLLOWING ☒

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐

INTERVAL= SECS

TAPE INFO HEADER ☐

EOF ☐

OMIT CHANNELS: (SEE APPENDIX A)

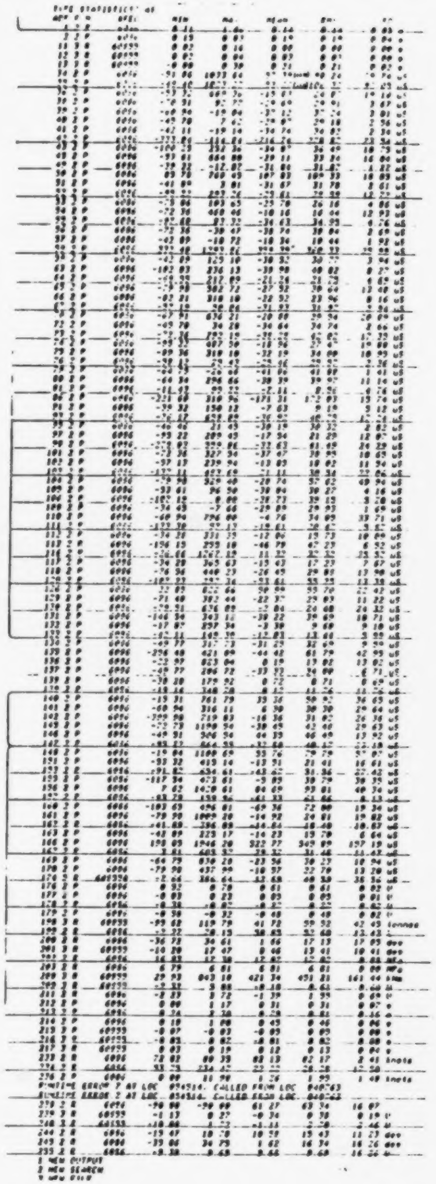
VIDEO RECORDING TAPE Nº: VT4

TIME : 12:05 TO 13:31:50 GMT

PHOTOS = # TO

COMMENTS Sampling pattern I2

81 - 10 - 36.1



VOYAGE RECORDS

INDEX Nº
81-10-36.2
YR. – VOYAGE – TAPE FILE

DATE 12th November 1981 RECORDING TIME 13:47:17 TO 14:11:47 GMT
ELAPSED TIME 00 H 24 M 30 S

CONTRACTOR: Arctec Canada Limited FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound LAT: 74 ° 'N
LONG: 84 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☒ BUBBLER ON ☒
AFT: M BALLAST ☐ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE					COMMENTS
ICE THICKNESS	CM		*	10	120		60	182	Heavy ice milling in multi-year ice
ICE COVER 1Y 2Y+MY TOT	TENTHS		*	7	3	10			
SNOW COVER	CM								
FLEXURAL STRENGTH	KPa								
COMPRESSIVE STRENGTH	MPa								
FRICTION									
PRESSURE	MPa								
RIDGES									
CRYSTAL									
SALINITY	%								

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING	*		*	
ASTERN	*			
TURNING				

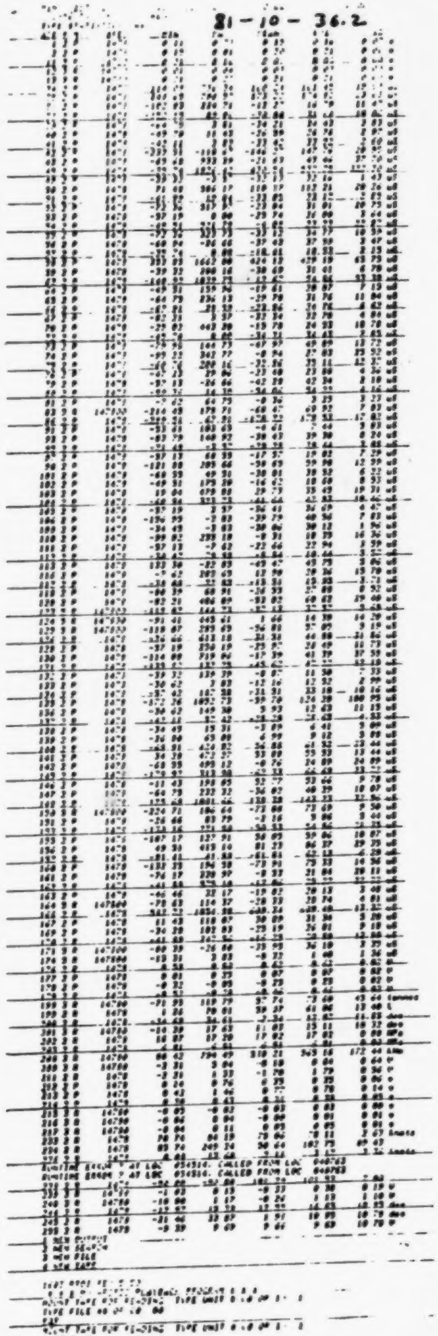
ICEBREAKER SUPPORT ☒
NAME
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT4 PHOTOS =
TIME: TO GMT # TO

COMMENTS Sampling pattern I2



81-10-36.2

VOYAGE RECORDS

INDEX Nº 81-10-37.1
YR. – VOYAGE – TAPE FILE

DATE 12th November 1981

RECORDING TIME 14:19:20 TO 15:10 GMT

ELAPSED TIME 00 H 51 M 00 S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound

LAT : 74 ° 'N

LONG : 84 ° 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M — CARGO ☒ — BUBBLER ON ☒

AFT: M — BALLAST ☐ — OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM		*	10	120		60	182		Heavy ice milling in multi-year ice
ICE COVER 1Y / 2Y+MY / TOT	TENTHS		*	7	3	10				
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN	*			
TURNING				

ICEBREAKER SUPPORT ☒

NAME CCGS Louis St. Laurent

FOLLOWING ☒

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN. See table 2.2

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐ INTERVAL= SECS

TAPE INFO HEADER ☐ EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT4

TIME : TO GMT

PHOTOS = # TO

COMMENTS Sampling pattern I2

No printout available

VOYAGE RECORDS

INDEX Nº 81-10-38.1
YR. – VOYAGE – TAPE FILE

DATE 12th November 1981 RECORDING TIME 15:11 TO 16:43 GMT
ELAPSED TIME H M S

CONTRACTOR: Arctec Canada Limited FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound LAT: 74 ° 30 'N
LONG: 82 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☒ BUBBLER ON ☒
AFT: M BALLAST ☐ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM		*	10	120		60	182		Pack ice
ICE COVER 1Y | 2Y+MY | TOT	TENTHS		*	7	3	10				
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN	*			
TURNING				

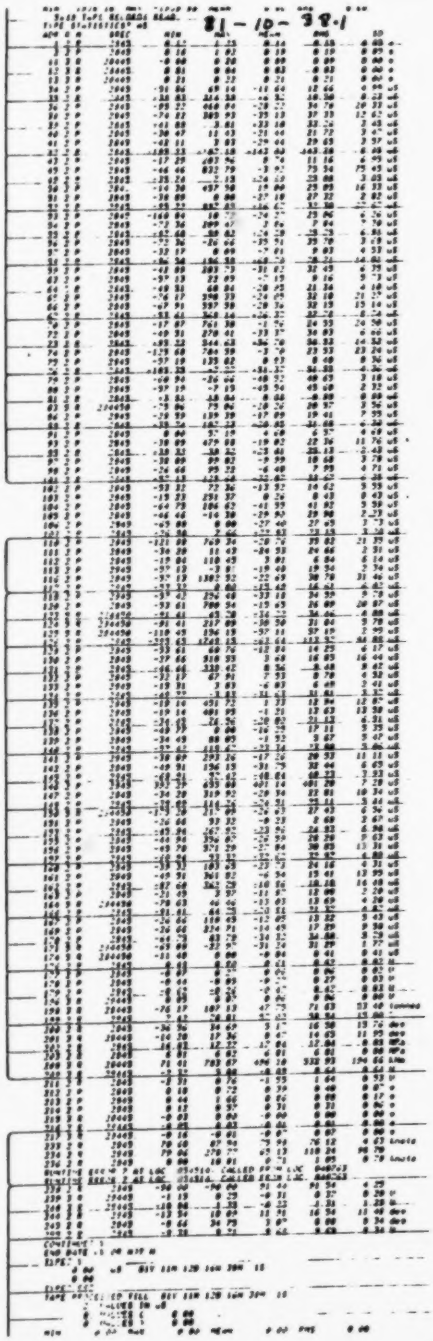
ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT4
TIME: 15:11 TO 16:43 GMT
PHOTOS = # TO

COMMENTS Sampling pattern B4
Printout processed from 15:50:37 to 16:38:00 only



81-10-38.1

VOYAGE RECORDS	INDEX Nº 81-10-39.1 YR. - VOYAGE - TAPE FILE

DATE 12th November 1981 RECORDING TIME 17:25:44 TO 19:45 GMT

ELAPSED TIME 2 H 19 M 10 S

CONTRACTOR : Arctec Canada Limited FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound LAT : 74 ° 'N

LONG : 83 ° 30 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M CARGO ☒ BUBBLER ON ☒

AFT: M BALLAST ☐ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			10	120		60	182		
ICE COVER 1Y | 2Y+MY | TOT	TENTHS			7	3	10				
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING	*			
ASTERN	*			
TURNING				

ICEBREAKER SUPPORT ☒

NAME CCGS Louis St. Laurent

FOLLOWING ☒

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐ INTERVAL= SECS

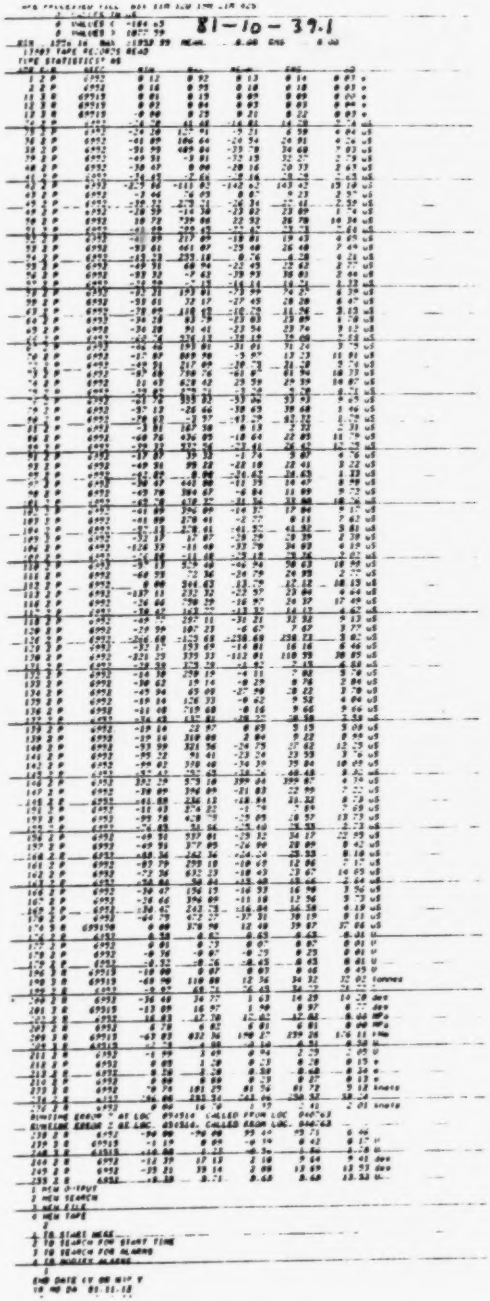
TAPE INFO HEADER ☐ EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT5 PHOTOS =

TIME : TO GMT # TO

COMMENTS Sampling patterns B4 or C3
Printout processed from 17:25:44 to 19:21:42 only



81-10-39.1

VOYAGE RECORDS

INDEX Nº
81-10-39.2
YR.-VOYAGE-TAPE FILE

DATE 12th November 1981

RECORDING TIME TO GMT

ELAPSED TIME H M S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound

LAT : 74 ° 'N

LONG : 83 ° 30 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M CARGO ☒ BUBBLER ON ☒

AFT: M BALLAST ☐ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			10	120		60	182		
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS			7	3	10				
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE RIDGES	MPa									
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS		*		
RAMMING		*		
ASTERN	*			
TURNING				

ICEBREAKER SUPPORT ☒

NAME CCGS Louis St. Laurent

FOLLOWING ☒

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐ INTERVAL= SECS

TAPE INFO HEADER ☐ EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:

TIME : TO GMT

PHOTOS =
TO

COMMENTS

Sampling patterns B4 or C3

No printout available

VOYAGE RECORDS

INDEX Nº 81-10-39.3
YR. – VOYAGE – TAPE FILE

DATE 12th November 1981 RECORDING TIME 19:47:30 TO 19:56:36 GMT
ELAPSED TIME H M S

CONTRACTOR : Arctec Canada Limited FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound LAT : 74 ° 'N
LONG : 83 ° 30 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☒ BUBBLER ON ☒
AFT: M BALLAST ☐ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			10	120		60	182		
ICE COVER 1Y 2Y+MY TOT	TENTHS			7	3	10				
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS		*		
RAMMING		*		
ASTERN	*			
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:
See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☒
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT5 PHOTOS =
TIME : TO GMT # TO

COMMENTS Sampling patterns B4 or C3

No printout available

VOYAGE RECORDS

INDEX Nº 81-10-40.1
YR. - VOYAGE - TAPE FILE

DATE 12th November 1981
RECORDING TIME 20:00:28 TO 21:14:00 GMT
ELAPSED TIME 00 H 13 M 32 S

CONTRACTOR: Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound
LAT: 74 ° 'N
LONG: 83 ° 30 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☒
BALLAST ☐
BUBBLER ON ☒
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE				COMMENTS
ICE THICKNESS	CM			10	120	60	182	
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS			7	3	10		
SNOW COVER	CM							
FLEXURAL STRENGTH	KPa							
COMPRESSIVE STRENGTH	MPa							
FRICTION								
PRESSURE	MPa							
RIDGES								
CRYSTAL								
SALINITY	%							

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING	*			
ASTERN	*			
TURNING				

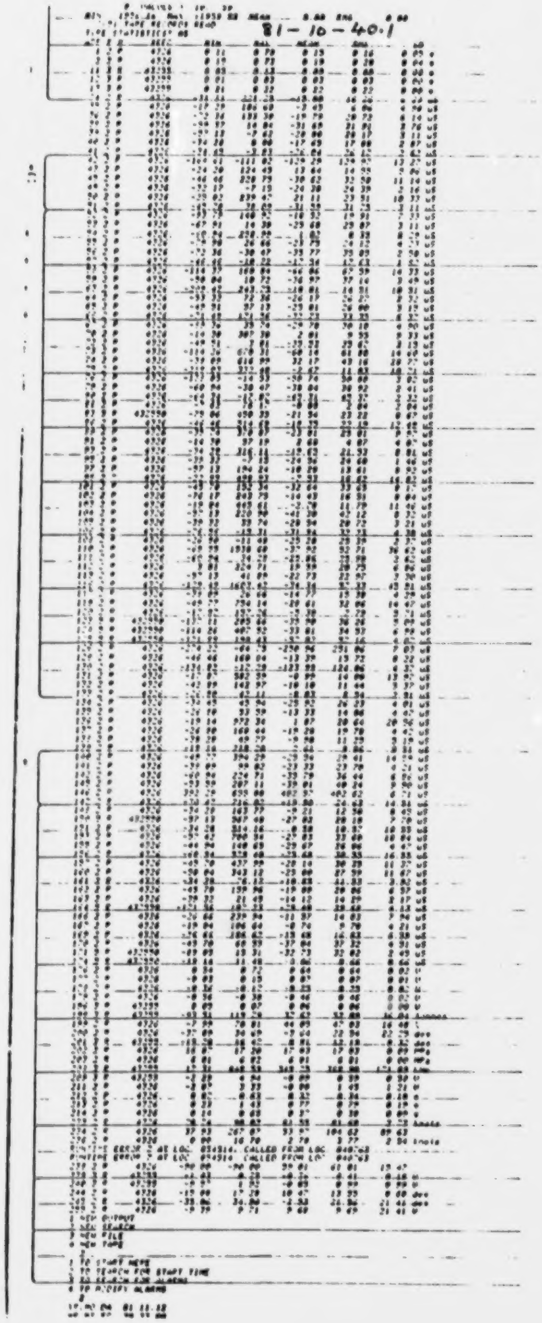
ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT5
TIME: 20:00 TO 21:14 GMT
PHOTOS = # TO

COMMENTS
Sampling pattern B4
Printout processed from 20:00:28 to 21:12:31 only



VOYAGE RECORDS

INDEX Nº 81-10-41.1
YR. – VOYAGE – TAPE FILE

DATE 12th November 1981 RECORDING TIME 22:20:00 TO 23:12 GMT
ELAPSED TIME H M S

CONTRACTOR : Arctec Canada Limited FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound LAT : 74 ° 'N
LONG : 83 ° 30 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☒ BUBBLER ON ☒
AFT: M BALLAST ☐ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			10	120		60	182		
ICE COVER 1Y / 2Y+MY / TOT	TENTHS			7	3	10			10	
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN	*			
TURNING				

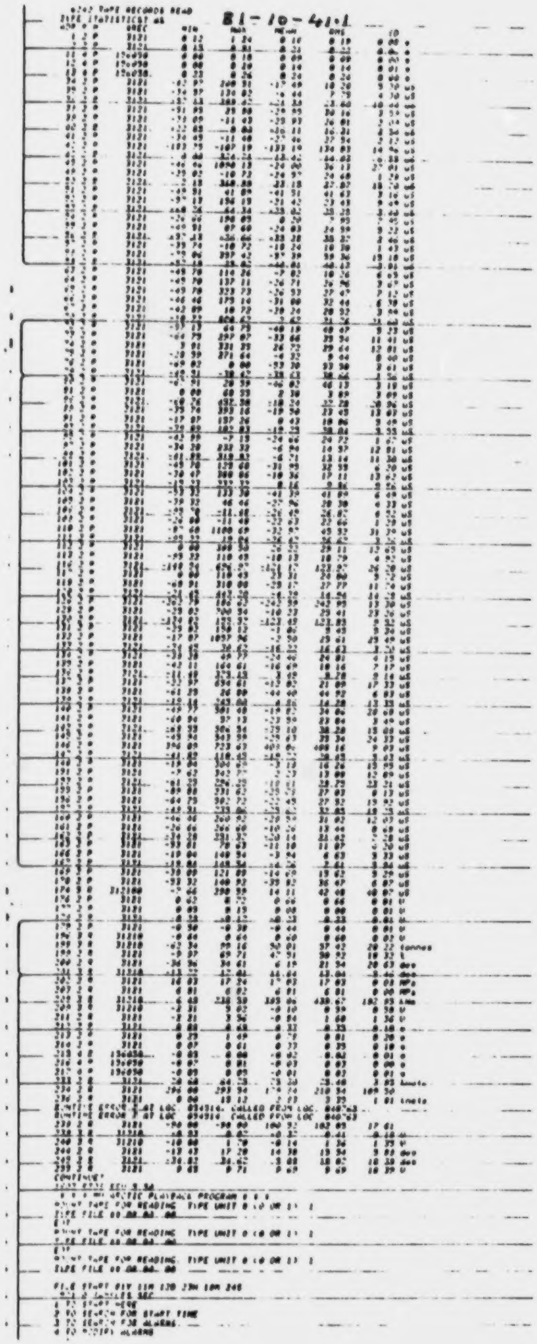
ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT5
TIME : TO GMT
PHOTOS =
TO

COMMENTS
Sampling pattern G2
Printout processed from 22:20:00 to 23:12:00 only


81-10-41.1

VOYAGE RECORDS

INDEX Nº 81-10-42A.1
YR.-VOYAGE-TAPE FILE

DATE 12th November 1981
RECORDING TIME 23:18 TO GMT
ELAPSED TIME H M S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Lancaster Sound
LAT : 74 ° 'N
LONG : 83 ° 30 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☒
BALLAST ☐
BUBBLER ON ☒
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER				UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS				CM			10	120		60	182		
ICE COVER	1Y	2Y+MY	TOT	TENTHS			7	3	10			10	
SNOW COVER				CM									
FLEXURAL STRENGTH				KPa									
COMPRESSIVE STRENGTH				MPa									
FRICTION													
PRESSURE				MPa									
RIDGES													
CRYSTAL													
SALINITY				%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN	*			
TURNING				

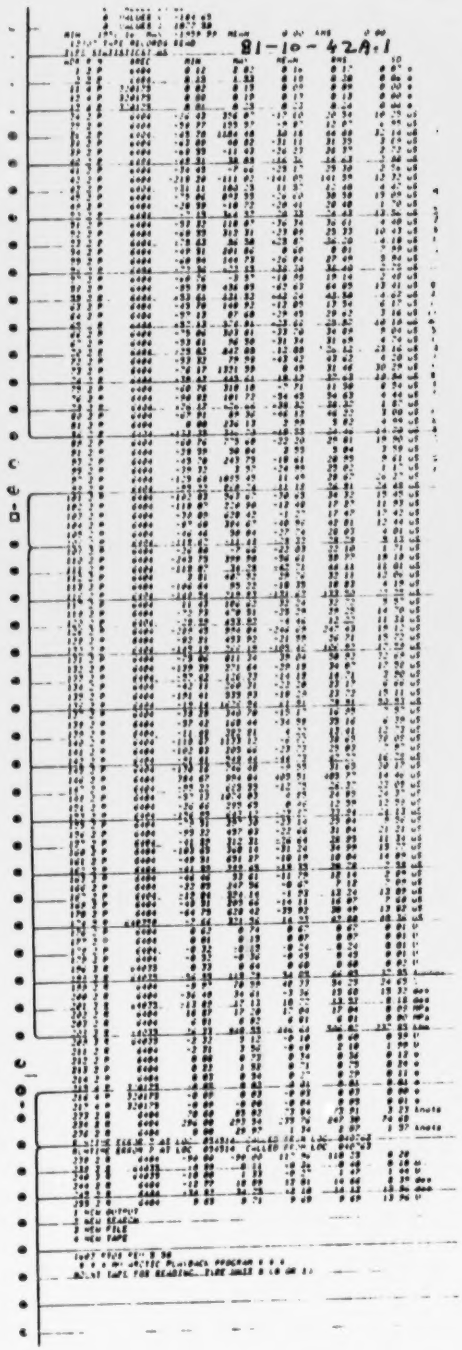
ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT5
TIME : TO GMT
PHOTOS =
TO

COMMENTS Sampling pattern G2
Printout processed from 23:18:31 to 01:05:11 only



81-10-42A.1

VOYAGE RECORDS

INDEX Nº
81-10-42B1.
YR.-VOYAGE-TAPE FILE

DATE November 13th, 1981

RECORDING TIME 01:24 TO GMT

ELAPSED TIME H M S

CONTRACTOR: Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Navy Board Inlet

LAT: 73 ° 40 'N

LONG: 83 ° 30 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M CARGO ☑ BUBBLER ON ☑

AFT: M BALLAST ☐ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			10	120		60	182		
ICE COVER 1Y 2Y+MY TOT	TENTHS			7	3	10			10	Backing & Ramming
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN	*			
TURNING				

ICEBREAKER SUPPORT ☒

NAME CCGS Louis St. Laurent

FOLLOWING ☒

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐ INTERVAL= SECS

TAPE INFO HEADER ☐ EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT5

TIME: TO GMT

PHOTOS =
TO

COMMENTS

Sampling Pattern C3

No printout available

VOYAGE RECORDS

INDEX Nº
81-10-43.1
YR. – VOYAGE – TAPE FILE

DATE November 13th, 1981
RECORDING TIME 13:32:20 TO 14:35:00 GMT
ELAPSED TIME 01 H 02 M 40 S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Navy Board Inlet
LAT : 73 ° 40 'N
LONG : 83 ° 30 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☒
BALLAST ☐
BUBBLER ON ☒
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM		*	10	120		60	182		
ICE COVER 1Y | 2Y+MY | TOT	TENTHS			7	3	10			10	in iceberg field
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN	*			
TURNING				

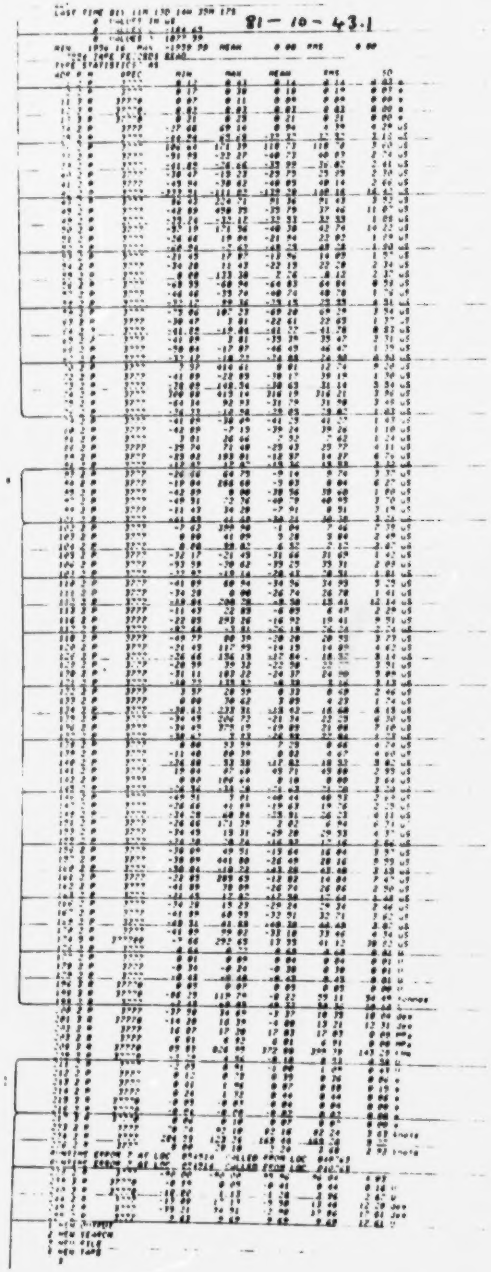
ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS
Sampling Pattern C3



81 – 10 – 43.1

VOYAGE RECORDS

INDEX Nº 81-10-43.2
YR.-VOYAGE-TAPE FILE

DATE November 13th, 1981
RECORDING TIME 14:36:10 TO 15:22:51 GMT
ELAPSED TIME 00 H 46 M 41 S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Navy Board Inlet
LAT : 73 ° 40 'N
LONG : 83 ° 30 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☒
BALLAST ☐
BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM			10 120 60 182	
ICE COVER 1Y 2Y+MY TOT	TENTHS			7 3 10	
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN	*			
TURNING				

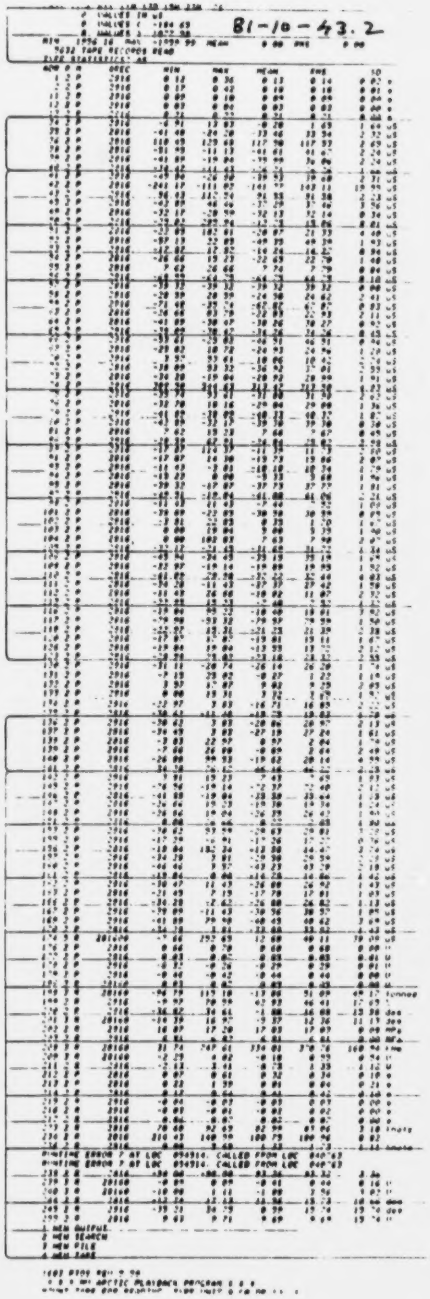
ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS: (SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS
Sampling Pattern C3



81-10-43.2

VOYAGE RECORDS

INDEX Nº
81-10-43.3
YR.-VOYAGE-TAPE FILE

DATE November 13th, 1981

RECORDING TIME 15:45:10 TO 16:37 GMT

ELAPSED TIME 00 H 52 M S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Navy Board Inlet

LAT: 73 ° 40 'N

LONG: 83 ° 30 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M CARGO ☒ BUBBLER ON ☒

AFT: M BALLAST ☐ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			10	120		60	182		
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS			7	3	10				
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒

NAME CCGS Louis St. Laurent

FOLLOWING ☒

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐ INTERVAL= SECS

TAPE INFO HEADER ☐ EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:

TIME : TO GMT

PHOTOS =
TO

COMMENTS

Sampling Pattern C3

No printout available

VOYAGE RECORDS

INDEX Nº
81-10-44.1
YR. – VOYAGE – TAPE FILE

DATE
November 13th, 1981
RECORDING TIME 16:24 TO GMT
ELAPSED TIME H M S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Navy Board Inlet
LAT : 73 ° 40 'N
LONG : 83 ° 30 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☒
BALLAST ☐
BUBBLER ON ☒
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			22	61					
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS			7	1	8				
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING	*			
ASTERN	*			
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN:
See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS
Sampling Patterns Blor C3

No printout available

VOYAGE RECORDS

INDEX Nº
81-10-44.2
YR. – VOYAGE – TAPE FILE

DATE November 13th, 1981 RECORDING TIME TO GMT
ELAPSED TIME H M S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Navy Board Inlet LAT : 73 ° 40 'N
LONG : 80 ° 30 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☒ BUBBLER ON ☒
AFT: M BALLAST ☐ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE					COMMENTS
ICE THICKNESS	CM			22	61				
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS			9.5	.5	10			Some ridges & grounded growlers
SNOW COVER	CM								
FLEXURAL STRENGTH	KPa								
COMPRESSIVE STRENGTH	MPa								
FRICTION									
PRESSURE	MPa								
RIDGES									
CRYSTAL									
SALINITY	%								

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS Sampling Patterns B4 or C3

No printout available

VOYAGE RECORDS

INDEX Nº
81-10-44.3
YR. – VOYAGE – TAPE FILE

DATE November 14th, 1981

RECORDING TIME 18:00 TO GMT

ELAPSED TIME H M S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Pond Inlet

LAT : 72 ° 45 'N

LONG : 87 ° 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M

AFT: M

CARGO ☑

BALLAST ☐

BUBBLER ON ☑

OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				
ICE COVER 1Y / 2Y+MY / TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				*
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒

NAME CCGS Louis St. Laurent

FOLLOWING ☐

IN ATTENDANCE ☒

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐

INTERVAL= SECS

TAPE INFO HEADER ☐

EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT5

TIME : TO GMT

PHOTOS =
TO

COMMENTS
Sampling Pattern B4 or C3

No printout available

VOYAGE RECORDS

INDEX Nº
81-10-44.4
YR. – VOYAGE – TAPE FILE

DATE November 14th, 1981

RECORDING TIME TO GMT

ELAPSED TIME H M S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº TP

LOCATION Pond Inlet

LAT : 72 ° 45 'N

LONG : 77 ° 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M

AFT: M

CARGO ☒

BALLAST ☐

BUBBLER ON ☒

OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				
ICE COVER 1Y 2Y+MY TOT	TENTHS				
SNOW COVER	CM				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒

NAME CCGS Louis St. Laurent

FOLLOWING ☐

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐

INTERVAL= SECS

TAPE INFO HEADER ☐

EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:

TIME : TO GMT

PHOTOS =

# TO

COMMENTS

Test File

No printout available

VOYAGE RECORDS

INDEX Nº
81-10-44.5
YR. – VOYAGE – TAPE FILE

DATE November 14th, 1981

RECORDING TIME TO 22:13 GMT

ELAPSED TIME H M S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº TP

LOCATION Pond Inlet

LAT : 72 ° 45 'N

LONG : 77 ° 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M CARGO ☐ BUBBLER ON ☑

AFT: M BALLAST ☐ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			61	122					
ICE COVER 1Y 2Y+MY TOT	TENTHS			9	1	10				
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN			*	
TURNING				

ICEBREAKER SUPPORT ☒

NAME CCGS Louis St. Laurent

FOLLOWING ☐

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐ INTERVAL= SECS

TAPE INFO HEADER ☐ EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT5

TIME : TO GMT

PHOTOS =

TO

COMMENTS

No printout available

VOYAGE RECORDS

INDEX Nº 81-10-44.6
YR. - VOYAGE - TAPE FILE

DATE November 14th, 1981
RECORDING TIME 22:19:10 TO 22:27 GMT
ELAPSED TIME H 7 M 50 S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Pond Inlet
LAT : 72 ° 45 'N
LONG : 77 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☑
BALLAST ☐
BUBBLER ON ☑
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			61	122					
ICE COVER (1Y, 2Y+MY, TOT)	TENTHS			9	1	10				
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN			*	
TURNING			*	

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT5
TIME : TO GMT
PHOTOS =
TO

COMMENTS
Sampling Pattern B

No printout available

VOYAGE RECORDS

INDEX Nº 81-10-45.1
YR. – VOYAGE – TAPE FILE

DATE November 14th, 1981
RECORDING TIME 22:27:47 TO GMT
ELAPSED TIME 00 H 28 M 40 S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Pond Inlet
LAT : 72 ° 45 'N
LONG : 77 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☒
BALLAST ☐
BUBBLER ON ☒
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE				COMMENTS
ICE THICKNESS	CM			61	122			
ICE COVER 1Y | 2Y+MY | TOT	TENTHS			9	1	10		
SNOW COVER	CM							
FLEXURAL STRENGTH	KPa							
COMPRESSIVE STRENGTH	MPa							
FRICTION								
PRESSURE	MPa							
RIDGES								
CRYSTAL								
SALINITY	%							

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN	*			
TURNING				

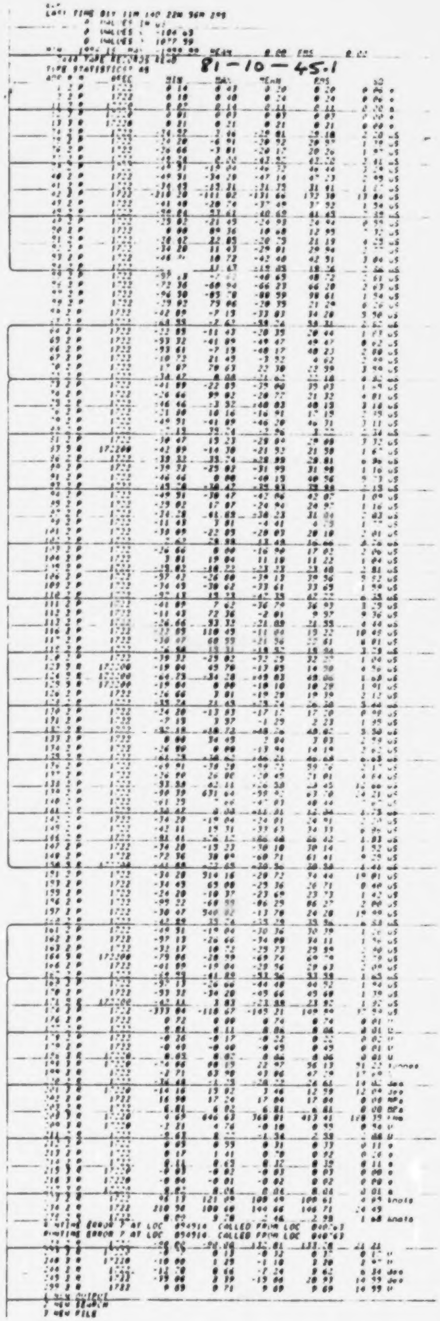
ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN
See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VTS
TIME : TO GMT
PHOTOS =
TO

COMMENTS
Sampling Pattern B4



81-10-45.1

VOYAGE RECORDS

INDEX Nº
81-10-46.1
YR. - VOYAGE - TAPE FILE

DATE November 15th, 1981

RECORDING TIME 10:3 TO 13:22 GMT

ELAPSED TIME 03 H 09 M S

CONTRACTOR: Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Pond Inlet

LAT: 72 ° 45 'N
LONG: 77 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☒ BUBBLER ON ☐
AFT: M BALLAST ☐ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			20			30	182		some ridging and some leads
ICE COVER 1Y 2Y+MY TOT	TENTHS			9	1	10				
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

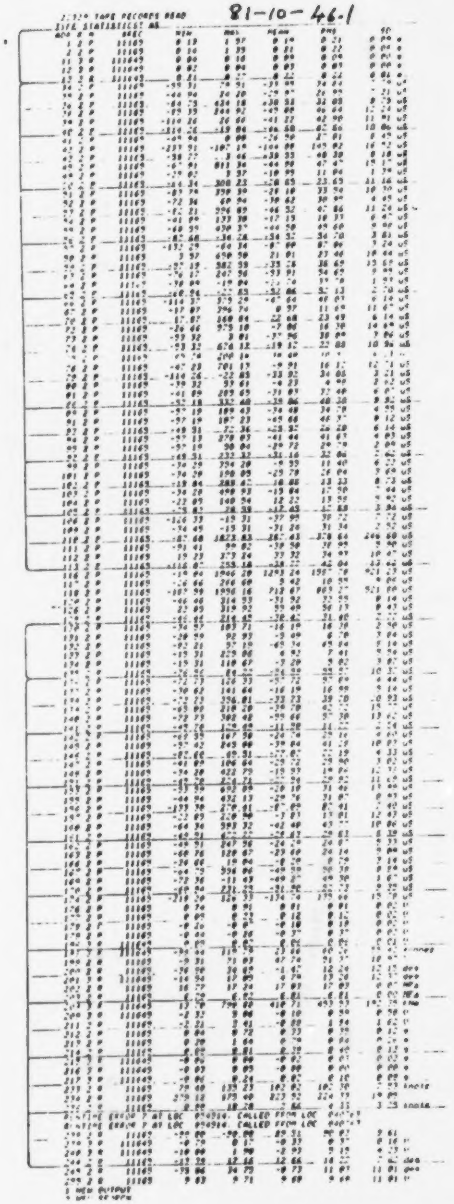
RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT6
TIME: TO GMT

PHOTOS =
TO

COMMENTS
Sampling Pattern C3 printout processed from 1013:38 to 1319:38 only

81-10-46.1



VOYAGE RECORDS

INDEX Nº 81-10-47.1
YR. - VOYAGE - TAPE FILE

DATE November 15th, 1981
RECORDING TIME 15:13 TO 16:07 GMT
ELAPSED TIME 0 H 54 M S

CONTRACTOR : Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Pond Inlet
LAT : 72 ° 45 'N
LONG : 77 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☒
BALLAST ☐
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			20			30	182		some ridging
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS			9	1	10				
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									ship speed = 5.7 knots

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT6
TIME : TO GMT
PHOTOS =
TO

COMMENTS
Sampling Pattern J or C3

No printout available

VOYAGE RECORDS

INDEX Nº
81-10-47.2
YR.-VOYAGE-TAPE FILE

DATE November 15th, 1981
RECORDING TIME 16:07:52 TO GMT
ELAPSED TIME H M S

CONTRACTOR: Arctec Canada Limited
FINAL REPORT Nº 3634 TP

LOCATION Pond Inlet
LAT: 72 ° 45 'N
LONG: 77 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M
AFT: M
CARGO ☒
BALLAST ☐
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			20			30	182		some ridging
ICE COVER (1Y / 2Y+MY / TOT)	TENTHS			9	1	10				
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING	*			
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☒
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN. See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐
INTERVAL= SECS
TAPE INFO HEADER ☐
EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT6
TIME: TO GMT
PHOTOS =
TO

COMMENTS
Sampling Patterns J

No printout available

VOYAGE RECORDS

INDEX Nº
81-10-47.3
YR.-VOYAGE-TAPE FILE

DATE November 15th, 1981

RECORDING TIME 16:41 TO 16:51 GMT

ELAPSED TIME 00 H 10 M S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Pond Inlet

LAT : 72 ° 45 'N

LONG : 77 ° 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M CARGO ☒ BUBBLER ON ☐

AFT: M BALLAST ☐ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			20			30	182		Following lead in 1st year. ice
ICE COVER 1Y 2Y+MY TOT	TENTHS			9	1	10				
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	*
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒

NAME CCGS Louis St. Laurent

FOLLOWING ☐

IN ATTENDANCE ☒

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN. See table 2.2

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐ INTERVAL= SECS

TAPE INFO HEADER ☐ EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:

TIME : TO GMT

PHOTOS =

TO

COMMENTS

Sampling Patterns J

No printout available

VOYAGE RECORDS

INDEX Nº
81-10-47.4
YR. – VOYAGE – TAPE FILE

DATE 15th November 1981 RECORDING TIME TO GMT
ELAPSED TIME H M S

CONTRACTOR : Arctec Canada Limited FINAL REPORT Nº 3634 TP

LOCATION Pond Inlet LAT : 72 ° 45 'N
LONG : 77 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☒ BUBBLER ON ☐
AFT: M BALLAST ☐ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			20			30	182		
ICE COVER 1Y / 2Y+MY / TOT	TENTHS			9	1	10				Ship's speed = 11 knots
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☒

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME : TO GMT
PHOTOS =
TO

COMMENTS Sampling pattern J

No printout available

VOYAGE RECORDS

INDEX Nº
81-10-47.5
YR.-VOYAGE-TAPE FILE

DATE 15th November 1981

RECORDING TIME 17:07 TO GMT

ELAPSED TIME H M S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Pond Inlet

LAT : 74 ° 45 'N

LONG : 77 ° 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M

AFT: M

CARGO ☒

BALLAST ☐

BUBBLER ON ☐

OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			20			30	182		Some ridging
ICE COVER 1Y | 2Y+MY | TOT	TENTHS			9	1	10				
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES			*							
CRYSTAL										
SALINITY	%									Speed 6 - 10 knots

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒

NAME CCGS Louis St. Laurent

FOLLOWING ☐

IN ATTENDANCE ☒

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐

INTERVAL= SECS

TAPE INFO HEADER ☐

EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT6

TIME : TO GMT

PHOTOS = # TO

COMMENTS Sampling pattern J

No printout available

VOYAGE RECORDS

INDEX Nº
81-10-48.1
YR. – VOYAGE – TAPE FILE

DATE 15th November 1981

RECORDING TIME 20:04 TO 20:55 GMT

ELAPSED TIME 0 H 51 M S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Baffin Bay

LAT : 72 ° 30 'N

LONG : 75 ° 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M

AFT: M

CARGO ☒

BALLAST ☐

BUBBLER ON ☐

OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			20			30	182		
ICE COVER 1Y / 2Y+MY / TOT	TENTHS			9	1	10	9	1	10	
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN	*			
TURNING				

ICEBREAKER SUPPORT ☒

NAME CCGS Louis St. Laurent

FOLLOWING ☒

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐

INTERVAL= SECS

TAPE INFO HEADER ☐

EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT6

TIME : TO GMT

PHOTOS =
TO

COMMENTS Sampling patterns C3 or D

No printout available

VOYAGE RECORDS

INDEX Nº 81-10-48.2
YR. - VOYAGE - TAPE FILE

DATE 15th November 1981

RECORDING TIME 21:38 TO 22:32 GMT

ELAPSED TIME 00 H 54 M S

CONTRACTOR : Arctec Canada Limited

FINAL REPORT Nº 3634 TP

LOCATION Baffin Bay

LAT : 72 ° 30 'N

LONG : 75 ° 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD: M

AFT: M

CARGO ☒

BALLAST ☐

BUBBLER ON ☐

OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS	CM			20			30	182		
ICE COVER 1Y 2Y+MY TOT	TENTHS			9	1	10				
SNOW COVER	CM									
FLEXURAL STRENGTH	KPa									
COMPRESSIVE STRENGTH	MPa									
FRICTION										
PRESSURE	MPa									
RIDGES										
CRYSTAL										
SALINITY	%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN	*			
TURNING				

ICEBREAKER SUPPORT ☒

NAME CCGS Louis St. Laurent

FOLLOWING ☒

IN ATTENDANCE ☐

RATIONALE

REASON FOR TAPE

REASON FOR SAMPLING PATTERN. See table 2.2

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☐

INTERVAL = SECS

TAPE INFO HEADER ☐

EOF ☐

OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT6

TIME : TO GMT

PHOTOS =

TO

COMMENTS Sampling pattern C3

No printout available

VOYAGE RECORDS

INDEX Nº
81-10-49.1
YR. - VOYAGE - TAPE FILE

DATE 15th November 1981 RECORDING TIME TO GMT
ELAPSED TIME H M S

CONTRACTOR: Arctec Canada Limited FINAL REPORT Nº 3634 TP

LOCATION Baffin Bay LAT: 72 ° 30 'N
LONG: 75 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☒ BUBBLER ON ☐
AFT: M BALLAST ☐ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNIT	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM					
ICE COVER ☐ 1Y ☐ 2Y+MY ☐ TOT	TENTHS					
SNOW COVER	CM					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN: See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº:
TIME: TO GMT

PHOTOS =
TO

COMMENTS

No printout available

VOYAGE RECORDS

INDEX Nº 81-10-49.2
YR. – VOYAGE – TAPE FILE

DATE 15th November 1981 RECORDING TIME 23:17 TO 02:05 GMT
ELAPSED TIME 02 H 48 M S

CONTRACTOR : Arctec Canada Limited FINAL REPORT Nº 3634 TP

LOCATION Baffin Bay LAT : 72 ° 30 'N
LONG : 75 ° 'W

OPERATING CONDITIONS (SHIP)
DRAUGHT FWD: M CARGO ☒ BUBBLER ON ☐
AFT: M BALLAST ☐ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER				UNIT	MEAS	EST	RANGE						COMMENTS
ICE THICKNESS				CM			15			20			
ICE COVER	1Y	2Y+MY	TOT	TENTHS			8		8	8		8	
SNOW COVER				CM									
FLEXURAL STRENGTH				KPa									
COMPRESSIVE STRENGTH				MPa									
FRICTION													
PRESSURE RIDGES				MPa									
CRYSTAL													
SALINITY				%									

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT ☒
NAME CCGS Louis St. Laurent
FOLLOWING ☐
IN ATTENDANCE ☐

RATIONALE
REASON FOR TAPE
REASON FOR SAMPLING PATTERN. See table 2.2

RECORDING NOTES
MODE RECORDING ☐
STANDBY ☐ INTERVAL= SECS
TAPE INFO HEADER ☐ EOF ☐
OMIT CHANNELS:
(SEE APPENDIX A)

VIDEO RECORDING TAPE Nº: VT6 PHOTOS =
TIME : TO GMT # TO

COMMENTS Sampling pattern C3

No printout available

3.0 DEDICATED TRIALS

3.0 DEDICATED TRIALS

3.1 TRIALS RECORDS

Four dedicated trials were held for the M.V. ARCTIC:

1.	January 1980	Saguenay River
2.	October 1980	Baffin Island
3.	February 1981	Lake Melville
4.	July 1981	Admiralty Inlet

Each of these trials is included in one section which contains the following information:

A) **Trials Index:**
An index of tests conducted on the Dedicated Trials.

B) **Trials Map:**
A map indicating geographical location of the trials with indications of the sites where the tests were conducted.

C) **Sampling Pattern Records:**
A variety of sampling patterns were used during the dedicated trials. The sampling pattern records provide the rate and mode at which each of the sensors was sampled for tests during that trial.

D) **Trials Record**
The trials records are a summary of the raw data recorded on tape and manually during the Dedicated Trials. Each test is summarized on one Trials Record Sheet and contains the following items:

*Date of Test

*Nature of test carried out

*Contractor that conducted the test for TDC and corresponding TP number of the final report.

3.0 DEDICATED TRIALS (Cont'd)

3.1 TRIALS RECORDS (Cont'd)

D) Trials Record (Cont'd)

*Geographical location at which the test was conducted with latitude and longitude.

*Operating conditions of ship including the forward and aft draught, whether carrying cargo or in ballast, and if the bubbler system was in use.

*Environmental conditions during the test giving the range of parameters recorded such as:

. Ice Thickness and cover
. Snow Cover
. Flexural and compressive strength
. Friction
. Pressure
. Ridges
. Salinity
. Percent bare ice
. Air temperature
. Wind speed and direction
. Atmospheric pressure
. Cloud Cover

*Transit mode of the ship for that test (continuous, ramming, astern or turning), the type of channel (broken, old, new and open water) presented in matrix form, and type of icebreaker support provided, if any.

*Objective of the test, and reason/s for the choice of sampling pattern.

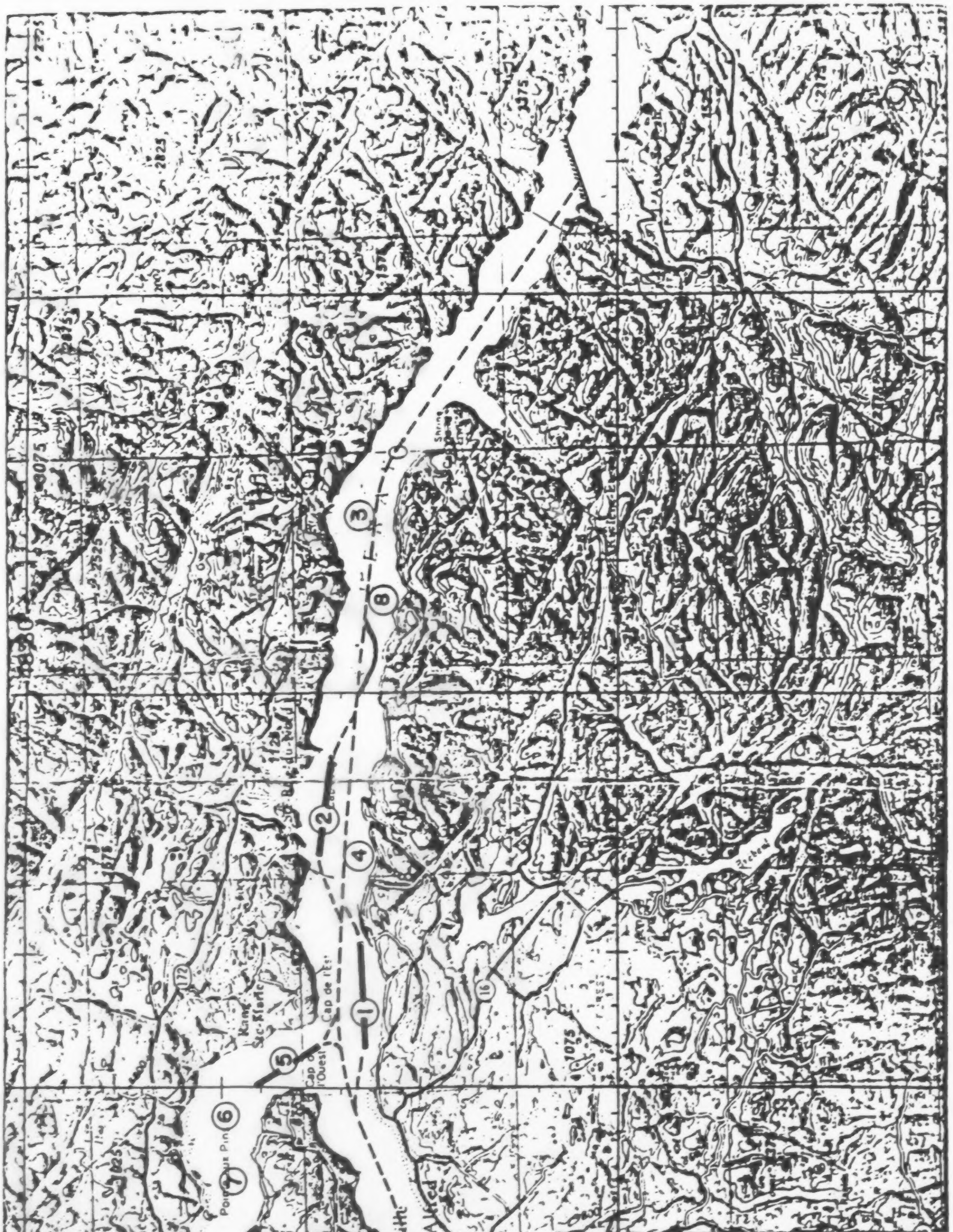
3.2 SAGUENAY RIVER TRIALS 1980

TEST INDEX

Saguenay Trials

TEST NO.	TEST
1	Straight Run No. 1
2	Straight Run No. 2
3	Straight Run No. 3
4	Straight Run No. 4
5	Straight Run No. 5
6	Straight Run No. 6
7	Straight Run No. 7
8	Turning Circle in Ice (partial)
9	Turning Circle in Open Water

Nine (9) data tapes and one (1) video tape were recorded on this Dedicated Trial.


③
⑧
②
④
①
⑤
⑥
⑦
Cap de l'Est
Cap de l'Ouest
Pointe aux Pins
Bagotville
Port-Alfred
16
172

KEY MAP
SHOWING GENERAL
LOCATION OF TEST
RUNS AND TEST AREAS.
FIGURE 3.1

SAMPLING PATTERN
SAGUENAY RIVER TRIALS - ALL TESTS

Channel Number	Rate	Mode	Channel Number	Rate	Mode	Channel Number	Rate	Mode
1	3	P	31	3	P	61		
2	3	P	32			62		
3			33			63	2	P
4			34	3	P	64		
5			35	3	P	65	2	P
6			36	3	P	66	3	P
7			37			67		
8			38	4	R	68		
9			39	3	P	69	4	R
10			40	2	P	70		
11			41	2	P	71	4	R
12			42	2	P	72	3	P
13	4	R	43	3	P	73	2	P
14	4	R	44			74		
15			45			75	4	R
16	4	R	46	4	R	76		
17	4	R	47			77	4	R
18	4	R	48	3	P	78	2	P
19	4	R	49			79	4	R
20	4	R	50			80		
21	4	R	51			81		
22	4	R	52	2	P	82	4	R
23	4	R	53	2	P	83		
24			54			84		
25			55			85	3	P
26	4	R	56			86		
27	4	R	57			87		
28			58			88	2	P
29	4	R	59	3	P	89		
30			60			90	3	P

SAMPLING PATTERN
SAGUENAY RIVER TRIALS - ALL TESTS

Channel Number	Rate	Mode	Channel Number	Rate	Mode	Channel Number	Rate	Mode
91	4	R	121			151		
92			122			152		
93			123			153	4	R
94	2	P	124	2	P	154		
95			125			155		
96			126	2	P	156	3	P
97			127	4	R	157		
98			128			158		
99			129	2	P	159		
100	4	R	130			160	3	P
101			131			161		
102			132			162	4	R
103			133	4	R	163	2	P
104	4	R	134	2	P	164		
105	3	P	135	2	P	165		
106	4	R	136			166		
107			137	3	P	167		
108	4	R	138			168		
109	2	P	139	4	R	169	4	R
110			140	4	R	170	4	R
111			141			171		
112	2	P	142			172		
113			143			173	2	P
114			144	2	P	174	3	P
115	2	P	145	4	R	187	1	R
116			146			188	1	R
117	4	R	147			198	2	R
118			148			199	1	R
119			149			200	2	R
120	2	P	150			201	2	R

SAMPLING PATTERN
SAGUENAY RIVER TRIALS - ALL TESTS

Channel Number	Rate	Mode
202	2	R
203	2	R
204	1	R
205	1	R
206	1	R
208	3	R
224	1	R
225	1	R
226	1	R
228	1	R
229	1	R
230	1	R
231	1	R
232	1	R
233	1	R
234	1	R
236	1	R
237	1	R
238	1	R
239	1	R
240	1	R
244	1	R
245	1	R
252	1	R
253	1	R

DEDICATED TRIALS

DATE 20th January 1980

TEST 1: Straight run No. 1

CONTRACTOR German & Milne Inc.

FINAL REPORT NO. TR 2627 Volume II

LOCATION Saguenay River - Area I on Fig. I

LAT: ° 'N
LONG: ° 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 10.0 M.
AFT. 11.5 M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM			44.5	44.5	No significant tidal or river current effects
ICE COVER 1Y 2Y MY TOT	TENTHS	*		10 / / / 10	10 / / / 10	
SNOW COVER	CM.		*	0	2.5	
FLEXURAL STRENGTH	KPa		*	350		
COMPRESSIVE STRENGTH	MPa		*	7.24		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰		*	5	7	
% BARE ICE.	%		*	40		
AIR TEMP	DEG C	*		-9		
WIND SPEED	KNOTS	*		18	43	
WIND DIRN		*		W		
ATMOSPHERIC PRESSURE	KPa	101.1		101.1		
CLOUD COVER	TENTHS		*	10		

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME: CCGS d'Iberville
FOLLOWING
IN ATTENDANCE *

OBJECTIVE 1. Determine power level vs speed vs ice thickness. 2. Determine structural response to ice breaking.

REASON FOR SAMPLING PATTERN Collect broad range of data for possible future analysis.

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐

INTERVAL • SEC

HEADER ☒
EOF ☒

OMIT CHANNELS: 66,75,127,156,203,204,205,206,239,240

VIDEO RECORDING TIME VTI 14.49 TO 15.20 GMT

PHOTOS • 1
2 TO

TESTS Tape No.	TIME ON TAPE START	 STOP	POWER SETTING	ERPM	Observed Speed (knots)
80-T1-1.1	1448:50	1449.27	Stop	0	0
80-T1-1.1	1449:27	1450:26	Dead slow	360	0
80-T1-1.1	1450:26	1452:45	Slow	400	0
80-T1-1.1	1452:45	1459:32	1/2 ahead	400	1.92
80-T1-1.1	1459:32	1511:54	3/4 ahead	400	3.56
80-T1-1.1	1511:54	1520:03	Full ahead	420	7.36

COMMENTS
(a) Speeds given are the mean value after acceleration had ceased and prior to power change.
(b) As Box No. 5 off, correction factors must be applied to conversion equations. (See Appendix A)
(c) Times on tape are local (EST) times minus 7 hours.
(d) Analysis of ice samples by NRC Ice laboratory.

DEDICATED TRIALS

DATE 20th January 1980

TEST 2: Straight run No. 2

CONTRACTOR German & Milne Inc.

FINAL REPORT NO. TR 2627 Volume II

LOCATION Saguenay River
Area 1 on figure 2

LAT: ° 'N
LONG: ° 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 10.0 **M.**
AFT. 11.5 **M.**
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		44.5	44.5	No significant tidal or river current effects.
ICE COVER (1Y 2Y MY TOT)	TENTHS	*		10, , , 10	10, , , 10	
SNOW COVER	CM.	*		0	2.5	
FLEXURAL STRENGTH	KPa		*	350		
COMPRESSIVE STRENGTH	MPa		*	7.24		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰		*	5	7	
% BARE ICE	%		*	40		
AIR TEMP	DEG C	*		-9°		
WIND SPEED	KNOTS	*		18	43	
WIND DIRN		*		W		
ATMOSPHERIC PRESSURE	KPa	*		101.1		
CLOUD COVER	TENTHS		*	10		

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME: C.C.G.S. d'Iberville
FOLLOWING
IN ATTENDANCE *

OBJECTIVE 1. Determine power level vs speed vs ice thickness.
2. Determine structural response to ice breaking.

REASON FOR SAMPLING PATTERN Collect broad range of data for possible future analysis.

RECORDING NOTES

MODE **RECORDING** ☒
STANDBY ☐
INTERVAL * **SEC**
HEADER ☒
EOF ☒
OMIT CHANNELS: 66,75,127,156,203,204,205,206,239,240

VIDEO RECORDING TIME 1525 **TO** VTI 1549 **GMT**

PHOTOS * 1
2 **TO**

TESTS Tape No.	TIME ON TAPE START	STOP	Power Setting	ERPM	Observed Speed (knots)
80-T1-2.1	-	1524:00	Off	0	0
80-T1-2.1	1524:00	1525:00	1/4 ahead	400	0
80-T1-2.1	1525:29	1528:31	1/2 ahead	400	1.59
80-T1-2.1	1528:31	1536:00	3/4 ahead	400	3.50
80-T1-2.1	1536:00	1548:02	full ahead	420	6.22

COMMENTS

a) Tape full at 1530:00. New tape on at 1542:32, thus transition from 3/4 to full ahead not recorded.
b) As box No. 5 off, correction factor must be applied to conversion equations. (See Appendix A)
c) Sections of tape 2 faulty, causing some difficulties in data retrieval.
d) Analysis of ice samples by NRC ice laboratory.

DEDICATED TRIALS

DATE 21st January 1980	TEST 3: Straight run No. 3

CONTRACTOR German & Milne Inc.

FINAL REPORT NO. TR 2627 Volume II

LOCATION Saguenay River - Area 2 in fig. 1

LAT: ° 'N

LONG: ° 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 10.0 M. AFT 11.5 M.

CARGO ☐ BALLAST ☐

BUBBLER ON ☐ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		48	52	
ICE COVER 1Y 2Y MY TOT	TENTHS			10 10	10 10	
SNOW COVER	CM.			0	3.2	
FLEXURAL STRENGTH	KPa		*	350		
COMPRESSIVE STRENGTH	MPa		*	7.24		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%		*	5	7	
% BARE ICE	%			80		
AIR TEMP	DEG C	*		-20°		
WIND SPEED	KNOTS	*		50	60	
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS		*	10		

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME: CCGS d'Iberville

FOLLOWING

IN ATTENDANCE *

OBJECTIVE 1. Determine power level vs speed vs ice thickness
2. Determine structural response to ice breaking

REASON FOR SAMPLING PATTERN
Collect broad range of data for possible future analysis

RECORDING NOTES

MODE RECORDING ☒ STANDBY ☐

INTERVAL * SEC

HEADER ☒ EOF ☒

OMIT CHANNELS: 66,75,127,156,203,204,205,206,239,240

VIDEO RECORDING TIME VT1 1355 TO 1410 GMT

PHOTOS * # TO

TESTS Tape No.	TIME ON TAPE START	STOP	Power Setting	ERPM	Observed Speed (knots)
80-T1-5.1	1353:57	1354:21	1/2 ahead	400	0
80-T1-5.1	1354:21	1356:40	3/4 ahead	400	0
80-T1-5.1	1356:40	1408:50	Full ahead	420	5.32

COMMENTS ·

a) Times on tape are local (EST) minus 5 hours
b) As box No. 5 off, correction factor must be applied to conversion equation.
c) Analysis of ice samples by NRC ice laboratory

DEDICATED TRIALS

DATE 21st January 1980

TEST 4: Straight Run No. 4

CONTRACTOR German & Milne Inc.

FINAL REPORT NO. TP 2627 Volume II

LOCATION Saguenay River Area 2 on Figure 1

LAT: ° 'N
LONG: ° 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 10.0 M.
AFT. 11.5 M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		47	50	
ICE COVER 1Y | 2Y | MY | TOT	TENTHS			10 | | | 10	10 | | | 10	
SNOW COVER	CM.	*		0	3.8	
FLEXURAL STRENGTH	KPa		*	350		
COMPRESSIVE STRENGTH	MPa		*	7.24		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰		*	5	7	
% BARE ICE	%		*	80		
AIR TEMP	DEG C	*		-20		
WIND SPEED	KNOTS	*		50	60	
WIND DIRN				W		
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS		*	10		

TRANSIT MODE

CHANNEL / MODE	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN			-	
TURNING				

ICEBREAKER SUPPORT

NAME: CCGS d'Iberville
FOLLOWING
IN ATTENDANCE *

OBJECTIVE 1. Determine power level vs speed vs ice thickness
2. Determine structural response to ice breaking

REASON FOR SAMPLING PATTERN
Collect broad range of data for possible future analysis

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐

INTERVAL * SEC

HEADER ☒
EOF ☒

OMIT CHANNELS:
66,75,127,156,203,204,205,206,239,240

VIDEO RECORDING TIME VT1
1413 TO 1432 GMT

PHOTOS * 1
3 TO

TESTS Tape No.	TIME ON TAPE START	STOP	Power Setting	ERPM	Speed (knots)
80-T1-6.1	1414.15	1415.20	Slow	400	0
80-T1-6.1	1415:20	1418:18	1/2 ahead	400	0
80-T1-6.1	1418:18	1421:23	3/4 ahead	400	0
80-T1-6.1	1421:23	1432:35	full ahead	420	5.15

COMMENTS

a) Test already in progress at tape start (1414:15 h)
b) As box No. 5 off, correction factor must be applied to sensor conversion equation (See Appendix A)
c) Analysis of ice samples by NRC ice laboratory

DEDICATED TRIALS

DATE 21st January 1980	TEST 5: Straight run No. 5
CONTRACTOR German & Milne Inc.	FINAL REPORT NO. TP 2627 Volume II
LOCATION Saguenay River Area 2 on figure 1	LAT: ° 'N LONG: ° 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 10.0 M. CARGO ☐ BUBBLER ON ☐

AFT. 11.5 M. BALLAST ☒ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		48	50	No significant tidal or river current effects
ICE COVER 1Y 2Y MY TOT	TENTHS	*		10 | | | 10	10 | | | 10	
SNOW COVER	CM.	*		0	2.5	
FLEXURAL STRENGTH	KPa		*	350		
COMPRESSIVE STRENGTH	MPa		*	7.24		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰		*	5	7	
% BARE ICE	%		*	80		
AIR TEMP	DEG C	*		-20		
WIND SPEED	KNOTS	*		50	60	
WIND DIRN				W		
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS		*	10		

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME: CCGS d'Iberville

FOLLOWING

IN ATTENDANCE *

OBJECTIVE 1. Determine power level vs speed vs ice thickness
2. Determine structural response to ice breaking

REASON FOR SAMPLING PATTERN

Collect broad range of data for possible future analysis

RECORDING NOTES

MODE RECORDING ☒ INTERVAL * SEC HEADER ☒

STANDBY ☐ EOF ☒

OMIT CHANNELS:

66,75,127,156,203,204,205,206,239,240

VIDEO RECORDING TIME VT1

1507 TO 1532 GMT

PHOTOS * 2

3,4 TO

TESTS Tape No.	TIME ON TAPE START	STOP	Power Setting	ERPM	Speed (knots)
80-T1-7.1	1507:52	1508:1	Stop	0	0
80-T1-7.1	1508:01	1509:51	1/2 ahead	400	0
80-T1-7.1	1509:51	1513:01	3/4 ahead	400	0
80-T1-7.1	1513:01	1519:01	Full ahead (1)	420	0
80-T1-7.1	1522:31	1531:15	Full ahead (2)	420	5.57

COMMENTS

a) No forward progress on first attempt at full ahead, therefore ship reversed a short distance and then was moved forward again.

b) As box No. 5 off, correction factor must be applied to sensor conversion equations (See Appendix A)

c) Analysis of ice samples by NRC ice laboratory.

DEDICATED TRIALS

DATE 21st January 1980

TEST 6: Straight run No. 6

CONTRACTOR German & Milne Inc.

FINAL REPORT NO. TR 2627 Volume II

LOCATION Saguenay River Area 2 on Fig. 1

LAT: ° 'N
LONG: ° 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 10.0 M.
AFT. 11.5 M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☒
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		50	54	
ICE COVER 1Y 2Y MY TOT	TENTHS			10 10	10 10	
SNOW COVER	CM.	*		0	2.5	
FLEXURAL STRENGTH	KPa		*	350		
COMPRESSIVE STRENGTH	MPa		*	7.24		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰		*	5	7	
% BARE ICE	%		*	80		
AIR TEMP	DEG C	*		-20		
WIND SPEED	KNOTS	*		50	60	
WIND DIRN				W		
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS		*	10		

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME: CCGS d'Iberville
FOLLOWING
IN ATTENDANCE *

OBJECTIVE 1. Determine power level vs speed vs ice thickness
2. Determine structural response to ice breaking

REASON FOR SAMPLING PATTERN

Collect broad range of data for possible future analysis

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐

INTERVAL * SEC

HEADER ☒
EOF ☒

OMIT CHANNELS: 66,75,127,156,203,204,205,206,239,240

VIDEO RECORDING TIME VT1 1626 TO 1632 GMT

PHOTOS * # 3 TO

TESTS Tape No.	TIME ON TAPE START	STOP	Power Setting	ERPM	Speed (knots)
80-T1-7.2	1612:35	1618:45	Off	0	0
80-T1-7.2	1618:45	1621:25	Slow	360	0
80-T1-7.2	1621:25	1624:15	1/2 ahead	400	0
80-T1-7.2	1624:15	1627:05	3/4 ahead	400	1.21
80-T1-8.1	1627:05	1646:16	Full ahead	420	6.24

COMMENTS

a) Times on tape 7 are local (EST) minus 6 hours
Times on tape 8 are local (EST) minus 5 hours
b) As box No. 5 off, correction factor must be applied to sensor conversion equations (See Appendix A)
c) Analysis of ice samples by NRC ice laboratory

DEDICATED TRIALS

DATE 21st January 1980

TEST 7: Straight run No. 7

CONTRACTOR German & Milne Inc.

FINAL REPORT NO. TR 2627 Volume II

LOCATION Saguenay River Area 5 on Fig. 2

LAT: ° 'N
LONG: ° 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 10.0 M.
AFT. 11.5 M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		31	43	No significant tidal or river current effects
ICE COVER (1Y 2Y · MY · TOT)	TENTHS	*		10 10	10 10	
SNOW COVER	CM.	*		0	2.5	
FLEXURAL STRENGTH	KPa		*	350		
COMPRESSIVE STRENGTH	MPa		*	7.24		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰		*	5	7	
% BARE ICE	%		*	40		
AIR TEMP	DEG C	*		-20		
WIND SPEED	KNOTS	*		50	60	
WIND DIRN				W		
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS		*	10		

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME: CCGS d'Iberville
FOLLOWING
IN ATTENDANCE *

OBJECTIVE 1. Determine power level vs speed vs ice thickness
2. Determine structural response to ice breaking

REASON FOR SAMPLING PATTERN
Collect broad range of data for possible future analysis

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐

INTERVAL * SEC

HEADER ☒
EOF ☒

OMIT CHANNELS:
66,75,127,156,203,204,205,206,239,240

VIDEO RECORDING TIME VT1
1743 TO 1808 GMT

PHOTOS *
TO

TESTS Tape No.	TIME ON TAPE START	TIME ON TAPE STOP	POWER SETTING	ERPM	Speed (knots)
80-T1-8.2	1742:35	1743:31	Stop	0	0
80-T1-8.2	1743:31	1747:36	1/2 ahead	400	0
80-T1-8.2	1747:36	1750:48	3/4 ahead	400	1.10
80-T1-8.2	1750:48	1803:31	Full ahead	420	8.20

COMMENTS

a) Times on tape are local (EST) minus 5 hours
b) As box No. 5 off, correction factor must be applied to sensor conversion equations (See Appendix A)
c) Analysis of ice samples by NRC ice laboratory.

DEDICATED TRIALS

DATE 20th January 1980

TEST 8: Turning circle in ice (partial)

CONTRACTOR German & Milne Inc.

FINAL REPORT NO. TP 2627 Volume II

LOCATION Saguenay River Area 8 on Fig. 1

LAT: ° 'N
LONG: ° 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 10.0 M.
AFT. 11.5 M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		48		No significant tidal or river current effects. Visibility 5 miles
ICE COVER 1Y / 2Y / MY / TOT	TENTHS	*		10 / / / 10	10 / / / 10	
SNOW COVER	CM.			0	3.2	
FLEXURAL STRENGTH	KPa			350		
COMPRESSIVE STRENGTH	MPa			7.24		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰		*	5	7	
% BARE ICE	%		*	20		
AIR TEMP	DEG C	*		-9		
WIND SPEED	KNOTS	*		18	43	
WIND DIRN				W		
ATMOSPHERIC PRESSURE	KPa	*		1011		
CLOUD COVER	TENTHS		*	10		

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING			*	

ICEBREAKER SUPPORT

NAME: CCGS d'Iberville
FOLLOWING
IN ATTENDANCE *

OBJECTIVE

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☐
INTERVAL • SEC
HEADER ☒
EOF ☒

OMIT CHANNELS: 66,75,127,156,203,204,205,206,239,240

VIDEO RECORDING TIME TO GMT

PHOTOS • 1
6 TO

TESTS Tape No.	TIME ON TAPE START	STOP	
80-T1-3.2	0932	0946	course change 55 degrees

COMMENTS

a) Test performed using a partial turn over a heading change of 51.3 degrees only, due to ice cover restrictions.
b) As Box No. 5 off, correction factor must be applied to conversion equations. (See Appendix A)

DEDICATED TRIALS

DATE 22 January 1980

TEST 9: Turning circle in open water

CONTRACTOR German & Milne Inc.

FINAL REPORT NO. TP 2627 Vol. II

LOCATION St. Lawrence River off Ile aux Lièvres

LAT: 47 • 58 'N
LONG: 69 • 44 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 10.0 M.
AFT 11.5 M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM					Tide of 3 knots at 210°
ICE COVER 1Y 2Y MY TOT	TENTHS			0	0	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰					
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING				*

ICEBREAKER SUPPORT

NAME:

FOLLOWING

IN ATTENDANCE

OBJECTIVE 1. Determine ship manoeuverability in open water.

REASON FOR SAMPLING PATTERN
Collect broad range of data for possible future analysis.

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐

INTERVAL * SEC

HEADER ☒
EOF ☒

OMIT CHANNELS:
66,75,127,156,203,204,205,206,239,240

VIDEO RECORDING TIME
TO GMT

PHOTOS *
TO

TESTS TIME ON TAPE
START STOP

TESTS	START	STOP	
80-T1-9.1	0225:23	0233:59	Course change 360 degrees

COMMENTS

a) As Box No. 5 off, correction factor must be applied to conversion equations. (See Appendix A)

3.3 BAFFIN ISLAND TRIALS - 1980

TEST INDEX

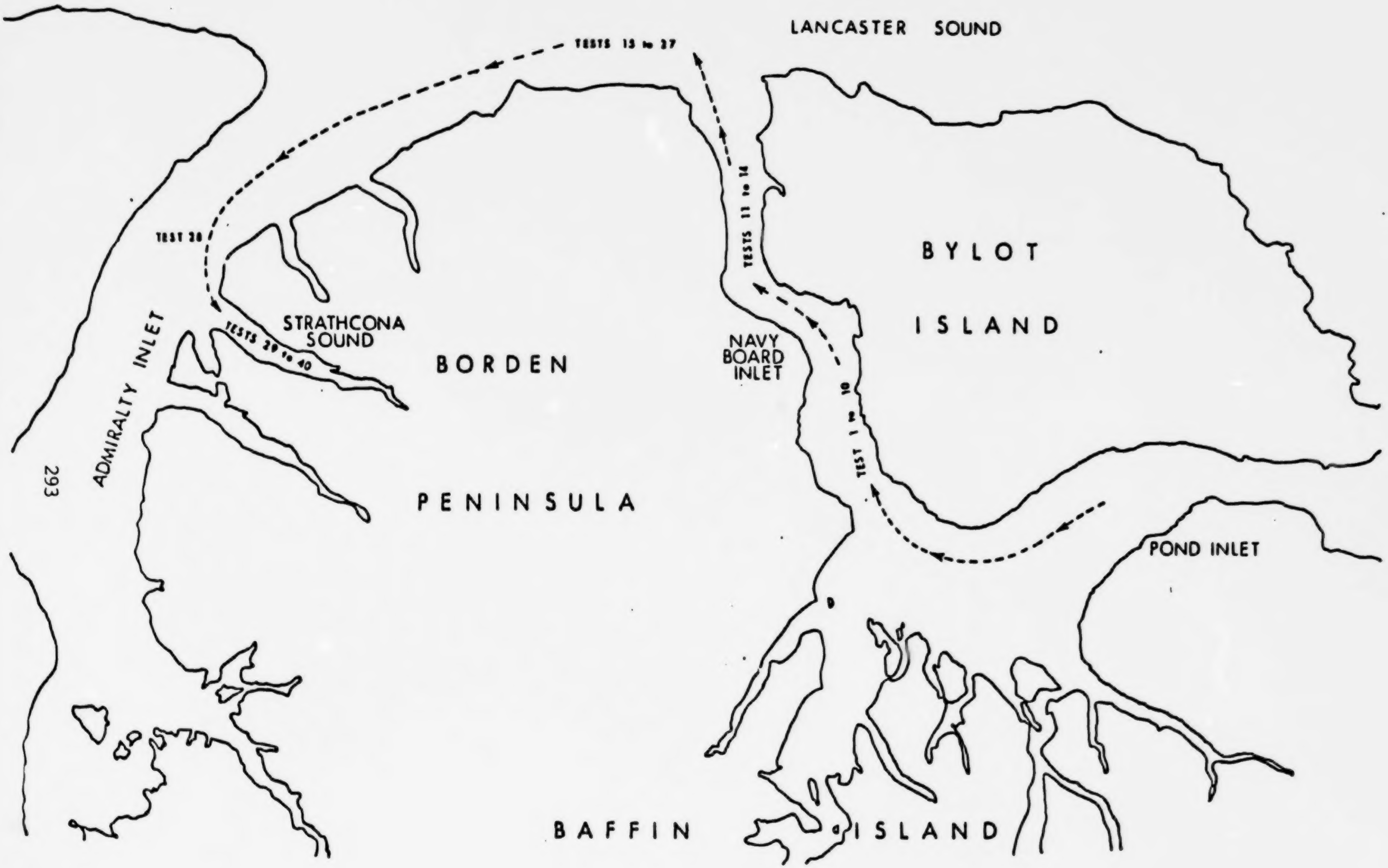
Baffin Island Trials - 1980

NO.	TEST
1	Speed/Power
2	Turning Circle
3	Speed/Power
4	Breakout
5	Acceleration Astern
6	Speed Power
7	Backing
8	Track Breakout
9	Speed/Power
10	Speed/Powr
11	Kempf Manoeuvre
12	Breakout
13	Power Check
14	Speed/Power
15	Speed/Power
16	Acceleration
17	Turning Circle
18	Speed/Power
19	Turning Circle
20	Breakout
21	Backing
22	Speed/Power
23	Speed/Power
24	Speed/Power
26	Backing
	Regular Monitoring while voyaging in ice.
	Regular Monitoring while voyaging in ice.
27	Speed/Power
	Overnight Recording
28	Ice Impact

TEST INDEX (Cont'd)
Baffin Island Trials - 1980

NO.	TEST
29	Star Manoeuvre
	Voyage Monitoring
	Voyage Monitoring
	Voyage Monitoring
	Voyage Monitoring
	Voyage Monitoring
30.1	Speed/Power
30.2	Speed/Power (Bubbler)
31	Speed/Power
32.1	Speed/Power (Bubbler)
32.2	Speed/Power
33.1	Speed/Power
33.2	Speed/Power
34.1	Power/Speed
34.2	Power/Speed
35.1	Power/Speed
35.2	Power/Speed
36	Star Manoeuvre
37	Docking
38	Turning Circle
39.1	Turning Circle
39.2	Turning Circle
40	Turning Circle

Twenty (20) data tapes and one (1) video tape were recorded on this Dedicated Trial.


LANCASTER SOUND
TESTS 15 to 27
TESTS 11 to 14
TEST 1 to 10
BYLOT ISLAND
NAVY BOARD INLET
POND INLET
TEST 28
TESTS 29 to 40
STRATHCONA SOUND
ADMIRALTY INLET
BORDEN PENINSULA
BAFFIN ISLAND

SHIP'S TRACK TESTING PROGRAM

Figure 3.2

SAMPLING PATTERNS

Baffin Island Trials

Page 1

Channel Number	A	B	A_1	B_1	A_2
1	1R	1R	1R	1R	1R
2	1R	1R	1R	1R	1R
3					
4					
5	1R	1R	1R	1R	1R
6	1R	1R	1R	1R	1R
7	1R	1R	1R	1R	1R
8	1R	1R	1R	1R	1R
9					
10					
11	3R	3R	3R	3R	3R
12	3R	3R	3R	3R	3R
13	3R	3R	3R	3R	3R
14					
15					
16					
17	1P	1P	2P	2P	2P
18					
19	1P	1P	2P	2P	2P
20	1P	1P	2P	2P	2P
21	1P	1P	2P	2P	2P
22					
23					
24					
25					
26	1P	1P	2P	2P	2P
27					
28					
29	1P	1P	2P	2P	2P
30					
31	1R	1R	1R	1R	1R

SAMPLING PATTERNS

Baffin Island Trials

Page 2

Channel Number	A	B	A_1	B_1	A_2
32	1P	1P	2P	2P	2P
33	1P	1P	2P	2P	2P
34	1P	1P	2P	2P	2P
35	1P	1P	2P	2P	2P
36	1P	1P	2P	2P	2P
37	1P	1P	2P	2P	2P
38	1P	1P	2P	2P	2P
39	1P	1P	2P	2P	2P
40	1P	1P	2P	2P	2P
41	1P	1P	2P	2P	2P
42	1P	1P	2P	2P	2P
43	1P	1P	2P	2P	2P
44					
45	1P	1P	2P	2P	2P
46	1P	1P	2P	2P	2P
47					
48	1P	1P	2P	2P	2P
49	1P	1P	2P	2P	2P
50	1P	1P	2P	2P	2P
51	1P	1P	2P	2P	2P
52	5R		5R		5R
53	5R		5R		5R
54	1P	1P	2P	2P	2P
55	1P	1P	2P	2P	2P
56	1P	1P	2P	2P	2P
57	1P	1P	2P	2P	2P
58	1P	1P	2P	2P	2P
59	1P	1P	2P	2P	2P
60	1P	1P	2P	2P	2P
61					
62					

SAMPLING PATTERNS

Baffin Island Trials

Channel Number	A	B	A_1	B_1	A_2
63	1P	1P	2P	2P	2P
64	5R		5R		5R
65	5R		5R		5R
66	1P	1P	2P	2P	2P
67	1P	1P	2P	2P	2P
68	1P	1P	2P	2P	2P
69	1P	1P	2P	2P	2P
70	1P	1P	2P	2P	2P
71	1P	1P	2P	2P	2P
72	1P	1P	2P	2P	2P
73	1P	1P	2P	2P	2P
74	1P	1P	2P	2P	2P
75	1P	1P	2P	2P	2P
76	1P	1P	2P	2P	2P
77					
78	1P	1P	2P	2P	2P
79					
80	1P	1P	2P	2P	2P
81	1P	1P	2P	2P	2P
82	1P	1P	2P	2P	2P
83	1P	1P	2P	2P	2P
84					
85	1P	1P	2P	2P	2P
86	1P	1P	2P	2P	2P
87					
88					
89	1P	1P	2P	2P	2P
90	1P	1P	2P	2P	2P
91	1P	1P	2P	2P	2P
92					
93					

SAMPLING PATTERNS

Baffin Island Trials

Channel Number	A	B	A_1	B_1	A_2
94					
95	1P	1P	2P	2P	2P
96					
97	1P	1P	2P	2P	2P
98	1P	1P	2P	2P	2P
99					
100					
101	1P	1P	2P	2P	2P
102	1P	1P	2P	2P	2P
103	1P	1P	2P	2P	2P
104	1P	1P	2P	2P	2P
105	1P	1P	2P	2P	2P
106	1P	1P	2P	2P	2P
107	5R		5R		5R
108	1P	1P	2P	2P	2P
109	5R		5R		5R
110	1P	1P	2P	2P	2P
111	1P	1P	2P	2P	2P
112	1P	1P	2P	2P	2P
113	1P	1P	2P	2P	2P
114					
115					
116	1P	1P	2P	2P	2P
117	1P	1P	2P	2P	2P
118	1P	1P	2P	2P	2P
119					
120	1P	1P	2P	2P	2P
121	1P	1P	2P	2P	2P
122	1P	1P	2P	2P	2P
123	5R		5R		5R
124	5R		5R		5R

SAMPLING PATTERNS

Baffin Island Trials

Channel Number	A	B	A_1	B_1	A_2
125	5R		5R		5R
126	1P	1P	2P	2P	2P
127	1P	1P	2P	2P	2P
128	1P	1P	2P	2P	2P
129	1P	1P	2P	2P	2P
130					
131	1P	1P	2P	2P	2P
132	1P	1P	2P	2P	2P
133	1P	1P	2P	2P	2P
134	1P	1P	2P	2P	2P
135					
136	1P	1P	2P	2P	2P
137					
138	1P	1P	2P	2P	2P
139					
140	1P	1P	2P	2P	2P
141					
142					
143					
144					
145	1P	1P	2P	2P	2P
146					
147	1P	1P	2P	2P	2P
148	1P	1P	2P	2P	2P
149	1P	1P	2P	2P	2P
150					
151					
152	1P	1P	2P	2P	2P
153	1P	1P	2P	2P	2P
154					
155	1P	1P	2P	2P	2P

SAMPLING PATTERNS

Baffin Island Trials

Channel Number	A	B	A_1	B_1	A_2
156					
157	1P	1P	2P	2P	2P
158	1P	1P	2P	2P	2P
159					
160	1P	1P	2P	2P	2P
161					
162	1P	1P	2P	2P	2P
163	1P	1P	2P	2P	2P
164	5R		5R		5R
165	5R		5R		5R
166	1P	1P	2P	2P	2P
167					
168					
169	1P	1P	2P	2P	2P
170	1P	1P	2P	2P	2P
171					
172					
173	5R		5R		5R
174	1P	1P	2P	2P	2P
175					
176					2P
177					2P
178					2P
179					2P
180					
187	1R	1R	1R	1R	1R
188	1R	1R	1R	1R	1R
196					
198	4R	4R	4R	4R	4R
199	1R	1R	1R	1R	1R
200	2R	2R	2R	2R	2R

SAMPLING PATTERNS

Baffin Island Trials

Channel Number	A	B	A_1	B_1	A_2
201	4R	4R	4R	4R	4R
202	2R	2R	2R	2R	2R
203	2R	2R	2R	2R	2R
204	1R	1R	1R	1R	1R
205	1R	1R	1R	1R	1R
206	1R	1R	1R	1R	1R
207					
208	4R	4R	4R	4R	4R
212	1P	1P	1P	1P	1P
213	1P	1P	1P	1P	1P
214	1P	1P	1P	1P	1P
215	3R	3R	3R	3R	3R
216	3R	3R	3R	3R	3R
217	3R	3R	3R	3R	3R
224	1R	1R	3R	3R	3R
225	1R	1R	3R	3R	3R
226	1R	1R	3R	3R	3R
227					
228	1R	1R	1R	1R	1R
229	1R	1R	1R	1R	1R
230	1R	1R	1R	1R	1R
231	1R	1R	1R	1R	1R
232	1R	1R	1R	1R	1R
233	1R	1R	1R	1R	1R
234	1R	1R	1R	1R	1R
235					
236	1R	1R	1R	1R	1R
237	1R	1R	1R	1R	1R
238	1R	1R	1R	1R	1R
239	1R	1R	1R	1R	1R
240	1R	1R	1R	1R	1R

SAMPLING PATTERNS

Baffin Island Trials

Channel Number	A	B	A_1	B_1	A_2
241					
242	2R	2R	2R	2R	2R
243					
244	2R	2R	2R	2R	2R
245	2R	2R	2R	2R	2R
246					
247					
248					
249					
250					
251					
252	1R	1R	1R	1R	1R
253	1R	1R	1R	1R	1R
254					
255	1R	1R	1R	1R	1R

DEDICATED TRIALS

DATE 26 October 1980

TEST #1: Speed/Power

CONTRACTOR Fenco Consultants Limited

FINAL REPORT NO. TP 3202

LOCATION Navy Board Inlet

LAT: 72 • 51 'N

LONG: 80 • 07 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05M. **CARGO** ☐ **BUBBLER ON** ☐

AFT. 10.29M. **BALLAST** ☒ **OFF** ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		18.0	18.6	
ICE COVER 1Y 2Y MY TOT	TENTHS				10 10	
SNOW COVER	CM.	*		.5		
FLEXURAL STRENGTH	KPa	*		210	430	
COMPRESSIVE STRENGTH	MPa	*		14.1		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰	*		6	9.5	
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS	*		3	4	
WIND DIRN		*		100°		
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

CHANNEL / MODE	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING ☐

IN ATTENDANCE ☐

OBJECTIVE 1. To determine the speed/power characteristics versus ice thickness

REASON FOR SAMPLING PATTERN 1. To collect a broad range of data for possible subsequent analysis

RECORDING NOTES

MODE **RECORDING** ☒ **STANDBY** ☐ **INTERVAL =** **SEC** **HEADER** ☐ **EOF** ☐

OMIT CHANNELS: 239 - 240 - 242

VIDEO RECORDING TIME VTR = ɸ - 14

15:00:04 **TO** 15:12:46 **GMT**

PHOTOS = **#** **TO**

TESTS Tape No.	TIME ON TAPE START	TIME ON TAPE STOP	Sampling Pattern
80-T2-1.1	15:00:10	15:04:59	A
80-T2-1.2	15:10:14	15:12:46	A
80-T2-2.2	15:23:56	15:26:22	A

COMMENTS Data Acquisition System and Video Set to local time (GMT-4 hours)

DEDICATED TRIALS

DATE 26th October 1980

TEST #2 Turning Circle

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TR 3202

LOCATION Navy Board Inlet

LAT: 72 • 51 'N
LONG: 80 • 07 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 M.
AFT. 10.29 M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		19.0		
ICE COVER (1Y 2Y MY TOT)	TENTHS			10 10		
SNOW COVER	CM.	*		.5		
FLEXURAL STRENGTH	KPa	*		210	430	
COMPRESSIVE STRENGTH	MPa	*		14.1		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%	*		6.9		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS	*		3	4	
WIND DIRN		*		100°		
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING			*	

ICEBREAKER SUPPORT

NAME:

FOLLOWING

IN ATTENDANCE

OBJECTIVE 1. To determine the turning radius vs ice thickness

REASON FOR SAMPLING PATTERN 1. To collect a broad range of data for possible subsequent analysis

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐

INTERVAL • SEC

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME VTR = 87
TO GMT

PHOTOS •
TO

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-2.3	15:33:31	15:43:20	A

COMMENTS Data acquisition system and video set to local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE 26 October 1980

TEST #3 Speed/Power

CONTRACTOR Fenco Consultants Ltd. **FINAL REPORT NO.** TP 3202

LOCATION Navy Board Inlet **LAT:** 72 • 51 'N **LONG:** 80 • 13 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 **M.** **CARGO** ☐ **BUBBLER ON** ☐
AFT 10.29 **M.** **BALLAST** ☒ **OFF** ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		19.0	26.7	
ICE COVER 1Y 2Y MY TOT	TENTHS			10	10	
SNOW COVER	CM.		*	10		
FLEXURAL STRENGTH	KPa	*		255	425	
COMPRESSIVE STRENGTH	MPa	*		7.1		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%	*		6.75		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS	*		3	4	
WIND DIRN		*		100°		
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING
IN ATTENDANCE -

OBJECTIVE 1. To determine the Speed/Power characteristics vs ice thickness

REASON FOR SAMPLING PATTERN 1. To collect a broad range of data for possible subsequent analysis

RECORDING NOTES

MODE **RECORDING** ☒ **STANDBY** ☐ **INTERVAL** • **SEC** **HEADER** ☐ **EOF** ☐

OMIT CHANNELS:

VIDEO RECORDING TIME VTR - 87 - 119
16.13.18 **TO** 16.40.16 **GMT**

PHOTOS • # **TO**

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-3.2	16.13.18	16.15.39	A
80-T2-3.3	16.22.52	16.25.16	A

COMMENTS Data acquisition and video systems set to local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE 27 October 1980	**TEST** #4 Breakout

CONTRACTOR Fenco Consultants Ltd. **FINAL REPORT NO.** TP 3202

LOCATION Navy Board Inlet **LAT:** 72 • 49 'N **LONG:** 80 • 11 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 **M.** **CARGO** ☐ **BUBBLER ON** ☐
AFT. 10.29 **M.** **BALLAST** ☒ **OFF** ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS.	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	26		
ICE COVER 1Y 2Y MY TOT	TENTHS			10 10		See Fig. 3.3
SNOW COVER	CM.	*		1.0		
FLEXURAL STRENGTH	KPa			255	425	
COMPRESSIVE STRENGTH	MPa	*		7.1		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰	*		6.75		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING

IN ATTENDANCE

OBJECTIVE 1. To determine ships behaviour when breaking out from being beset

REASON FOR SAMPLING PATTERN 1. To collect a broad range of data for possible subsequent analysis.

RECORDING NOTES

MODE **RECORDING** ☒ **STANDBY** ☐ **INTERVAL** * **SEC** **HEADER** ☐ **EOF** ☐

OMIT CHANNELS:

VIDEO RECORDING TIME **TO** **GMT** **PHOTOS** * **#** **TO**

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-4.1	09:22:56	09:22:16	A
80-T2-4.2	09:24:34	09:27:30	A

COMMENTS - Filters removed from S.P.

- Data acquisition and video systems set to local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE 27th October 1980

TEST #5 Acceleration Astern

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TP 3202

LOCATION Navy Board Inlet

LAT: 72 • 51 'N

LONG: 80 • 31 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05M. **CARGO** ☐ **BUBBLER ON** ☐

AFT. 10.29M. **BALLAST** ☒ **OFF** ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS.	EST	RANGE		COMMENTS
ICE THICKNESS"	CM	*		20.0	26.7	
ICE COVER 1Y 2Y MY TOT	TENTHS			10	10	
SNOW COVER	CM.		*			
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN			*	
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING

IN ATTENDANCE

OBJECTIVE 1. To determine ships behaviour while going astern in its broken channel.

REASON FOR SAMPLING PATTERN 1. To collect a broad range of data for possible subsequent analysis.

RECORDING NOTES

MODE **RECORDING** ☒ **STANDBY** ☐ **INTERVAL •** **SEC** **HEADER** ☐ **EOF** ☐

OMIT CHANNELS:

VIDEO RECORDING TIME **TO** **GMT**

PHOTOS • **#** **TO**

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-5.1.1	10:02:39	10:22:31	B

COMMENTS 1. Data acquisition and video systems set to local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE 27th October 1980

TEST #6 Speed/Power

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TR 3202

LOCATION Navy Board Inlet

LAT: 72 • 51 'N
LONG: 80 • 13 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 **M.**
AFT. 10.29 **M.**

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS.	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		31.0	33.0	
ICE COVER (1Y, 2Y, MY, TOT)	TENTHS			10	10	
SNOW COVER	CM.	*		.5		
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰	*		6.75		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING

IN ATTENDANCE

OBJECTIVE 1. To determine speed/power characteristics vs ice thickness

REASON FOR SAMPLING PATTERN 1. To collect a broad range of data for possible subsequent analysis.

RECORDING NOTES

MODE **RECORDING** ☒ **STANDBY** ☐

INTERVAL • **SEC**

HEADER ☐ **EOF** ☐

OMIT CHANNELS:

VIDEO RECORDING TIME 119 to 131
14:29:50 **TO** 14:51:15 **GMT**

PHOTOS • # **TO**

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-5.4	14:29:47	14:36:00	B
80-T2-5.5	14:42:24	14:44:00	B
80-T2-5.6	14:48:57	14:50:45	B

COMMENTS Data acquisition and video systems set to local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE 27th October 1980	**TEST** #7: Backing

CONTRACTOR Fenco Consultants Ltd. **FINAL REPORT NO.** TP 3202

LOCATION Navy Board Inlet Area 2 **LAT:** ° 'N **LONG:** ° 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 **M.** **CARGO** ☐ **BUBBLER ON** ☐
AFT. 10.29 **M.** **BALLAST** ☒ **OFF** ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS*	CM					
ICE COVER 1Y 2Y MY TOT	TENTHS			10	10	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰	*		6.75		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN		*		
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING

IN ATTENDANCE

OBJECTIVE 1. To examine ships behaviour, going astern in its broken channel.

REASON FOR SAMPLING PATTERN 1. To collect a broad range of data for possible subsequent analysis.

RECORDING NOTES

MODE **RECORDING** ☒ **STANDBY** ☐ **INTERVAL** • **SEC** **HEADER** ☒ **EOF** ☐

OMIT CHANNELS:

VIDEO RECORDING TIME **TO** **GMT** | **PHOTOS** • #/ **TO**

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-5.7	15:04:20	15:15:44	B

COMMENTS Data acquisition and video systems set to local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE 27th October 1980

TEST #8 Track Breakout

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TR 3202

LOCATION Navy Board Inlet Area 2

LAT: 72 • 51 'N
LONG: 80 • 13 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 **M.**
AFT. 10.29 **M.**

CARGO ☐
BALLAST ☒

BUBBLER ON ☒
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	300		
ICE COVER (1Y / 2Y / MY / TOT)	TENTHS			10 ☐ ☐ 10	☐ ☐ ☐ ☐	
SNOW COVER	CM.		*	3.0		
FLEXURAL STRENGTH	KPa			255	425	
COMPRESSIVE STRENGTH	MPa	*		7.1		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰	*		6.75		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS		*	*	
RAMMING				-
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING

IN ATTENDANCE

OBJECTIVE 1. To examine ship's response while trying to break out of its track.

REASON FOR SAMPLING PATTERN 1. To collect a broad range of data for possible subsequent analysis.

RECORDING NOTES

MODE **RECORDING** ☒ **STANDBY** ☐

INTERVAL • **SEC**

HEADER ☐ **EOF** ☐

OMIT CHANNELS:

VIDEO RECORDING TIME **TO** **GMT**

PHOTOS • **#** **TO**

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-5.8	15:57:10	16:07:53	B
80-T2-5.9	16:42:37	16:47:42	B

COMMENTS
- Helm 30°
- Data acquisition and video systems set to local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE 27th October 1980	**TEST** #10 Speed/Power

CONTRACTOR Fenco Consultants Ltd. **FINAL REPORT NO.** TR 3202

LOCATION Navy Board Inlet **LAT:** 72 • 51 'N **LONG:** 80 • 13 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 M. **CARGO** ☐ **BUBBLER ON** ☐
AFT. 10.29 M. **BALLAST** ☒ **OFF** ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS*	CM	*		30.0		
ICE COVER 1Y 2Y MY TOT	TENTHS			10 10		
SNOW COVER	CM.	*		3.0		
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰	*		6.75		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS	*		10		
WIND DIRN		*		0°		
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING
IN ATTENDANCE

OBJECTIVE 1. To determine speed/power characteristics vs ice thickness

REASON FOR SAMPLING PATTERN 1. To collect a broad range of data for possible subsequent analysis.

RECORDING NOTES

MODE **RECORDING** ☒ **STANDBY** ☐ **INTERVAL** • **SEC** **HEADER** ☐ **EOF** ☐

OMIT CHANNELS:

VIDEO RECORDING TIME **TO** **GMT** **PHOTOS** • **#** **TO**

TESTS Tape No.	TIME ON TAPE START	 STOP	Sampling Pattern
80-T2-5.10	17:06:40	17:08:30	B

COMMENTS
- Test aborted - no light
- Data acquisition and video system set at local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE 27th October 1980

TEST #9 Speed/Power

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TR 3202

LOCATION Navy Board Inlet

LAT: 72 • 51 'N
LONG: 80 • 13 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 **M.**
AFT. 10.29 **M.**

CARGO ☐
BALLAST ☒

BUBBLER ON ☒
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		26.0	30.0	
ICE COVER (1Y / 2Y / MY / TOT)	TENTHS			10	10	
SNOW COVER	CM.	*	1.0			
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					
% BARE ICE	%	*		6.75		
AIR TEMP	DEG C					
WIND SPEED	KNOTS			10	25	
WIND DIRN				0°		
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING
IN ATTENDANCE

OBJECTIVE 1. To determine speed/power characteristics vs ice thickness
2. To determine the effect of the Bubbler System on these characteristics

REASON FOR SAMPLING PATTERN 1. To collect a broad range of data for possible subsequent analysis

RECORDING NOTES

MODE **RECORDING** ☒ **STANDBY** ☐

INTERVAL = **SEC**

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME **TO** **GMT**

PHOTOS = **#** **TO**

TESTS Tape No.	TIME ON TAPE START	TIME ON TAPE STOP	Sampling Pattern
80-T2-5.9	16:45:59	16:47:35	B
80-T2-5.10	16:53:10	16:55:50	B

COMMENTS - Time - GMT - 4 hrs.
- Data acquisition and video systems set at local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE 28th October 1980

TEST #11 Kempf Manoeuvre

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TR 3202

LOCATION Navy Board Inlet Area 4

LAT: 73 ° 17 'N
LONG: 80 ° 54 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 **M.**
AFT. 10.29 **M.**

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	31.5		
ICE COVER (1Y, 2Y, MY, TOT)	TENTHS			10	10	
SNOW COVER	CM.		*	3.0		
FLEXURAL STRENGTH	KPa		*	255	425	
COMPRESSIVE STRENGTH	MPa		*	7.1		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					
% BARE ICE	%		*	6.75		
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

CHANNEL / MODE	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING			*	

ICEBREAKER SUPPORT

NAME:

FOLLOWING

IN ATTENDANCE

OBJECTIVE 1. To examine ship's manoeuvrability in ice

REASON FOR SAMPLING PATTERN 1. To collect a broad range of data for possible subsequent analysis.

RECORDING NOTES

MODE **RECORDING** ☒ **STANDBY** ☐

INTERVAL • **SEC**

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME **TO** **GMT**

PHOTOS • **#** **TO**

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-6.1	00:08:10	00:10:50	B

COMMENTS Helm - 20° P - Filters excluded from S.P.
- 20° S

- Data acquisition and video systems set at local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE 28th October 1980

TEST #12 Breakout

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TR 3202

LOCATION Navy Board Inlet Area 5

LAT: 73 ° 39 'N
LONG: 81 ° 07 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 M.
AFT. 10.29 M.

CARGO ☐
BALLAST ☐

BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS*	CM		*	30.0		
ICE COVER (1Y / 2Y / MY / TOT)	TENTHS			10	10	See Fig. 3.4
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰	*		6.75		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING

IN ATTENDANCE

OBJECTIVE

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE RECORDING ☒ STANDBY ☐

INTERVAL * SEC

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME TO GMT

PHOTOS * # TO

TESTS Tape No. **TIME ON TAPE** **START** **STOP**

No tape recording

COMMENTS

Data acquisition and video systems are set at local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE 28th October 1980

TEST #13 Power Check

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TP 3202

LOCATION Navy Board Inlet Area 6

LAT: 73 • 24 'N
LONG: 81 • 01 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 M.
AFT. 10.29 M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	30		
ICE COVER (1Y, 2Y, MY, TOT)	TENTHS			10	10	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa			255	425	
COMPRESSIVE STRENGTH	MPa			71		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%	*		6.75		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING
IN ATTENDANCE

OBJECTIVE

REASON FOR SAMPLING PATTERN To collect a broad range of data for possible subsequent analysis

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☐
INTERVAL • SEC
HEADER ☐
EOF ☐
OMIT CHANNELS:

VIDEO RECORDING TIME TO GMT

PHOTOS • # TO

TESTS Tape No. **TIME ON TAPE** START STOP

No tape recording

COMMENTS Data acquisition and video systems set at local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE 28 October 1980

TEST #14 Speed/Power

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TR 3202

LOCATION Navy Board Inlet Area 6

LAT: ° 'N
LONG: ° 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 M.
AFT. 10.29 M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		30.0		
ICE COVER 1Y 2Y MY TOT	TENTHS			10	10	
SNOW COVER	CM.	*		1.0		
FLEXURAL STRENGTH	KPa	*		255	425	
COMPRESSIVE STRENGTH	MPa	*		7.1		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰					
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING
IN ATTENDANCE

OBJECTIVE To determine the speed/power characteristics vs ice thickness

REASON FOR SAMPLING PATTERN To collect a broad range of data for possible subsequent analysis.

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☐

INTERVAL • SEC

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME TO GMT

PHOTOS • # TO

TESTS Tape No. **TIME ON TAPE** START STOP

No tape recording

COMMENTS Data acquisition and video systems set at local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE 28th October 1980

TEST #15 Speed/Power

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TP

LOCATION Lancaster Sound Area 1

LAT: 73 • 58 'N

LONG: 81 • 58 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05M. CARGO ☐ BUBBLER ON ☐

AFT. 10.29M. BALLAST ☐ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		29	38	
ICE COVER (1Y, 2Y, MY, TOT)	TENTHS			10 10		
SNOW COVER	CM.	*		2.0		
FLEXURAL STRENGTH	KPa			255	425	
COMPRESSIVE STRENGTH	MPa			71		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%	*		6.75		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING

IN ATTENDANCE

OBJECTIVE To determine speed/power characteristics vs ice thickness

REASON FOR SAMPLING PATTERN To collect a broad range of data for possible subsequent analysis

RECORDING NOTES

MODE RECORDING ☒ STANDBY ☐ INTERVAL • SEC HEADER ☐ EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME TO GMT

PHOTOS • # TO

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-8.4	14:01:40	14:03:15	A

COMMENTS

- Invalid data light is on
- Data acquisition and video systems are set at local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE 28th October 1980	**TEST** #16 Acceleration

CONTRACTOR Fenco Consultants Ltd. **FINAL REPORT NO.** **TP** 3202

LOCATION Lancaster Sound Area 1 **LAT:** 73 • 58 'N **LONG:** 81 • 58 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 **M.** **CARGO** ☐ **BUBBLER** **ON** ☐
AFT. 10.29 **M.** **BALLAST** ☒ **OFF** ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		33	39	
ICE COVER 1Y 2Y MY TOT	TENTHS			10	10	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa	*		255	425	
COMPRESSIVE STRENGTH	MPa	*		71		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					
% BARE ICE	%	*		6.75		
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING

IN ATTENDANCE

OBJECTIVE To determine the ship's acceleration vs ice thickness

REASON FOR SAMPLING PATTERN To obtain a broad range o- data for possible subsequent analysis

RECORDING NOTES

MODE **RECORDING** ☒ **STANDBY** ☐ **INTERVAL** * **SEC** **HEADER** ☐ **EOF** ☐

OMIT CHANNELS:

VIDEO RECORDING TIME VTR 489 **TO** **GMT** **PHOTOS** * **#** **TO**

TESTS Tape No.	TIME ON TAPE START	 STOP	Sampling Pattern
80-T2-8.6	15:17:16	15:29:00	B

COMMENTS Data acquisition and video systems set at local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE 28th October 1980	**TEST** #17 Turning Circle

CONTRACTOR Fenco Consultants Ltd. **FINAL REPORT NO.** TP 3202

LOCATION Lancaster Sound Area 1 **LAT:** 73 • 49 'N **LONG:** 82 • 23 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05M. **CARGO** ☐ **BUBBLER ON** ☐

AFT. 10.29M. **BALLAST** ☒ **OFF** ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		31.5		
ICE COVER 1Y 2Y MY TOT	TENTHS			10	10	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa	*		255	325	
COMPRESSIVE STRENGTH	MPa	*		7.1		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰	*		6.75		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

CHANNEL / MODE	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING			*	

ICEBREAKER SUPPORT

NAME:

FOLLOWING

IN ATTENDANCE

OBJECTIVE To determine the ship's manoeuvrability vs ice thickness

REASON FOR SAMPLING PATTERN To obtain a broad range of data for possible subsequent analysis

RECORDING NOTES

MODE **RECORDING** ☑ **STANDBY** ☐ **INTERVAL •** **SEC** **HEADER** ☐ **EOF** ☐

OMIT CHANNELS:

VIDEO RECORDING TIME **TO** **GMT** **PHOTOS •** **#** **TO**

TESTS Tape No.	TIME ON TAPE START	 STOP	Sampling Pattern
80-T2-8.6	15:29:00	15:35:00	B

COMMENTS Data acquisition and video systems set at local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE 28th October 1980	**TEST** #18 Speed/Power

CONTRACTOR Fenco Consultants Ltd. **FINAL REPORT NO.** TP 3202

LOCATION Lancaster Sound Area 1 **LAT:** 73 • 58 'N **LONG:** 81 • 58 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 M. **CARGO** ☐ **BUBBLER ON** ☐
AFT. 10.29 M. **BALLAST** ☒ **OFF** ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		29.0		
ICE COVER (1Y / 2Y / MY / TOT)	TENTHS			10	10	
SNOW COVER	CM.	*		2.0		
FLEXURAL STRENGTH	KPa			255	425	
COMPRESSIVE STRENGTH	MPa			7.1		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					
% BARE ICE	%	*		6.75		
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING

IN ATTENDANCE

OBJECTIVE To determine the speed/power characteristics vs ice thickness

REASON FOR SAMPLING PATTERN To collect a broad range of data for possible subsequent analysis

RECORDING NOTES

MODE **RECORDING** ☒ **STANDBY** ☐ **INTERVAL** * **SEC** **HEADER** ☐ **EOF** ☐

OMIT CHANNELS:

VIDEO RECORDING TIME **TO** **GMT** **PHOTOS** * **#** **TO**

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-9.1	15:55:00	16:00:00	B

COMMENTS Data acquisition and video systems set at local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE 28th October 1980

TEST #19 Turning Circle

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TP. 3202

LOCATION Lancaster Sound Area 1

LAT: 73 • 58 'N
LONG: 81 • 58 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 M.
AFT. 10.29 M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		29.0		
ICE COVER (1Y, 2Y, MY, TOT)	TENTHS			10 10		
SNOW COVER	CM.	*		2.0		
FLEXURAL STRENGTH	KPa	*		255	425	
COMPRESSIVE STRENGTH	MPa	*		71		
FRICTION						
PRESSURE	MPa					
RIDGES			*			
CRYSTAL						
SALINITY	%					
% BARE ICE	%	*		6.75		
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

CHANNEL / MODE	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING			*	

ICEBREAKER SUPPORT

NAME:
FOLLOWING ☐
IN ATTENDANCE ☐

OBJECTIVE To determine ship's manoeuvrability vs ice thickness

REASON FOR SAMPLING PATTERN To collect a broad range of data for possible subsequent analysis

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐
INTERVAL • SEC
HEADER ☐
EOF ☐
OMIT CHANNELS:

VIDEO RECORDING TIME TO GMT

PHOTOS • # TO

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-8.6	15:44:00	15:47:09	B
80-T2-9.1	15:47:10	15:50:00	B

COMMENTS -HELM 30°
-Data acquisition and video systems set at local time (GMT - 4 hrs)

DEDICATED TRIALS

DATE 29th October 1980	**TEST** #20 Breakout

CONTRACTOR Fenco Consultants Ltd. **FINAL REPORT NO.** TP 3202

LOCATION Lancaster Sound Area 2 **LAT:** 73 • 48 'N **LONG:** 81 • 23 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 M. **CARGO** ☐ **BUBBLER ON** ☐
AFT. 10.29 M. **BALLAST** ☒ **OFF** ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	43.0		
ICE COVER 1Y 2Y MY TOT	TENTHS			10 ☐ ☐ 10	☐ ☐ ☐ ☐	See Fig. 3.5
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					
% BARE ICE	%	*		6.4		
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING ☐

IN ATTENDANCE ☐

OBJECTIVE To examine ship performance while breaking out when beset

REASON FOR SAMPLING PATTERN To collect a broad range of data for possible subsequent analysis

RECORDING NOTES

MODE **RECORDING** ☒ **STANDBY** ☐ **INTERVAL =** **SEC** **HEADER** ☐ **EOF** ☐

OMIT CHANNELS:

VIDEO RECORDING TIME No VTR **TO** **GMT**

PHOTOS = **#** **TO**

TESTS Tape No.	TIME ON TAPE START	 STOP	Sampling Pattern
80-T2-10.1	08:26:15	08:33:00	B_1

COMMENTS

-Data acquisition and video systems set at local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE 29th October 1980

TEST #21 Backing

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TP 3202

LOCATION. Lancaster Sound Area 2

LAT: 74 • 48 'N
LONG: 81 • 23 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 **M.**
AFT. 10.29 **M.**

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	43		
ICE COVER 1Y 2Y MY TOT	TENTHS			10 ☐ ☐ 10	☐ ☐ ☐ ☐	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					
% BARE ICE	%	*		6.4		
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN		*		
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING ☐

IN ATTENDANCE ☐

OBJECTIVE To measure structural response to backing in a frozen channel

REASON FOR SAMPLING PATTERN To collect broad range of data for possible further analysis.

RECORDING NOTES

MODE **RECORDING** ☒ **STANDBY** ☐

INTERVAL * **SEC**

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME NO VTR **TO** **GMT**

PHOTOS * **#** **TO**

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-10.2	09:05:23	09:10:00	B

COMMENTS -Backing in Frozen Channel
-Data acquisition and video systems are set at local time (GMT - 4 hrs)

DEDICATED TRIALS

DATE 29th October 1980

TEST #22 Speed/Power

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TP 3202

LOCATION Lancaster Sound Area 2

LAT: 73 • 49 'N
LONG: 81 • 15 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 M.
AFT. 10.29 M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☒
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		34.0	51.0	
ICE COVER (1Y, 2Y, MY, TOT)	TENTHS			10	10	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa	*		215	445	
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰	*		6.4		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING ☐

IN ATTENDANCE ☐

OBJECTIVE 1. To determine speed/power characteristics while transiting ice.
2. To determine the effect of the bubbler system on these characterisitics.

REASON FOR SAMPLING PATTERN To collect broad range of data for possible further analysis.

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐

INTERVAL • SEC

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME VTR = 617 - 641
TO GMT

PHOTOS •
TO

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-10.3	09:50:00	09:56:00	B_1

COMMENTS -Data acquisition and video systems are set at local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE 29th October 1980

TEST #23 Speed/Power

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TR 3202

LOCATION Lancaster Sound Area 2

LAT: 74 ° 49 'N
LONG: 81 ° 15 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 M.
AFT. 10.29 M.
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		44.0	37.0	
ICE COVER IY 2Y MY TOT	TENTHS			10	10	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa	*		215	445	
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰	*		6.4		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING ☐
IN ATTENDANCE ☐

OBJECTIVE To measure speed/power characterisitics while transiting ice

REASON FOR SAMPLING PATTERN To collect a broad range of data for possible further analysis

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐
INTERVAL • SEC
HEADER ☐
EOF ☐
OMIT CHANNELS:

VIDEO RECORDING TIME VTR = 617 - 641 TO GMT

PHOTOS # # TO

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-10.3	09:56:00	10:02:00	B_1

COMMENTS -Data acquisition and video systems are set at local time (GMT - 4 hrs)

DEDICATED TRIALS

DATE 29th October 1980	**TEST** #24 Speed/Power

CONTRACTOR Fenco Consultants Ltd. **FINAL REPORT NO.** TR 3202

LOCATION Lancaster Sound Area 2 **LAT:** 74 ° 49 'N **LONG:** 81 ° 15 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 **M.** **CARGO** ☐ **BUBBLER ON** ☒
AFT. 10.29 **M.** **BALLAST** ☒ **OFF** ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		37	34	
ICE COVER 1Y 2Y MY TOT	TENTHS			10	10	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa			215	445	
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					
% BARE ICE	%	*		6.4		
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

CHANNEL / MODE	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING ☐

IN ATTENDANCE ☐

OBJECTIVE 1. To determine speed/power characteristics vs ice thickness
2. To determine effect of the bubbler system on the above characteristics

REASON FOR SAMPLING PATTERN 1. To collect a broad range of data for possible subsequent analysis.

RECORDING NOTES

MODE **RECORDING** ☒ **STANDBY** ☐ **INTERVAL =** **SEC** **HEADER** ☐ **EOF** ☐

OMIT CHANNELS:

VIDEO RECORDING TIME VTR = 641 - 657 **TO** **GMT** **PHOTOS =** **#** **TO**

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-10.4	10:47:10	10:51:07	B_1

COMMENTS -Data acquisition and video systems are set at local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE 29th October 1980

TEST #25 Speed/Power

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TP 3202

LOCATION Lancaster Sound Area 2

LAT: 73 • 24 'N
LONG: 81 • 01 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 **M.**
AFT. 10.29 **M.**

CARGO ☐
BALLAST ☒

BUBBLER **ON** ☐ **OFF** ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		31	45	
ICE COVER 1Y 2Y MY TOT	TENTHS			10 10		
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa	*				
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING

IN ATTENDANCE

OBJECTIVE To determine speed/power characteristics vs ice thickness

REASON FOR SAMPLING PATTERN To collect a broad range of data for possible subsequent analysis

RECORDING NOTES

MODE **RECORDING** ☒ **STANDBY** ☐

INTERVAL • **SEC**

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME VTR = 641 - 657 **TO** **GMT**

PHOTOS • # **TO**

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-10.4	10:51:07	10:55:40	B 1

COMMENTS Data acquisition and video systems are set at local time (GMT - 4 hrs)

DEDICATED TRIALS

DATE 29th October 1980

TEST #26 Backing

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TP 3202

LOCATION Lancaster Sound Area 2

LAT: 73 • 42 'N

LONG: 80 • 57 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 M.
AFT. 10.29 M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		35	45	Sheet ice
ICE COVER (1Y, 2Y, MY, TOT)	TENTHS			10	10	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa	*		215	445	
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					
% BARE ICE	%	*		6.4		
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN			*	
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING
IN ATTENDANCE

OBJECTIVE To determine ship's performance while going astern in 10/10 ice

REASON FOR SAMPLING PATTERN To obtain a broad range of data for possible subsequent analysis.

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐

INTERVAL • SEC

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME VTR = 657 - 661
TO GMT

PHOTOS •
TO

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-11.1	13:43:51	13:47:10	B_1

COMMENTS -Data acquisition and video systems are set at local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE 29th October 1980

TEST Regular Monitoring while voyaging in ice

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TP 3202

LOCATION Lancaster Sound

LAT: ° 'N
LONG: ° 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 **M.**
AFT. 10.29 **M.**

CARGO ☐
BALLAST ☒

BUBBLER **ON** ☐ **OFF** ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM					
ICE COVER (IY / 2Y / MY / TOT)	TENTHS			10	10	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰					
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING
IN ATTENDANCE

OBJECTIVE

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE **RECORDING** ☐ **STANDBY** ☒

INTERVAL = 30 **SEC**

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME 1608 **TO** 1620 **GMT**

PHOTOS = # **TO**

TESTS Tape No.	TIME ON TAPE START	TIME ON TAPE STOP	Sampling Pattern
80-T2-11.3	16:08:10	16:20:03	B_1

COMMENTS -Data acquisition and video systems are set at local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE 29th October 1980

TEST Regular Monitoring While Voyaging in Ice

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TR 3202

LOCATION Lancaster Sound

LAT: ° 'N
LONG: ° 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 **M.**
AFT. 10.29 **M.**

CARGO ☐
BALLAST ☒

BUBBLER **ON** ☐ **OFF** ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM					
ICE COVER (IY / 2Y / MY / TOT)	TENTHS			10	10	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING

IN ATTENDANCE

OBJECTIVE

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE **RECORDING** ☐ **STANDBY** ☒

INTERVAL = 30 SEC

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME **TO** **GMT**

PHOTOS = # **TO**

TESTS Tape No.	TIME ON TAPE START	 STOP	Sampling Pattern
80-T2-11.4	16:24:10	16:27:37	B_1

COMMENTS - Data acquisition and video systems are set at local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE October 29, 1980	**TEST** #27 Speed/Power

CONTRACTOR Fenco Consultants Ltd. **FINAL REPORT NO.** TP 3202

LOCATION Lancaster Sound Area 3 **LAT:** 73 • 48 'N **LONG:** 80 • 57 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 **M.** **CARGO** ☐ **BUBBLER ON** ☐
AFT 10.29 **M.** **BALLAST** ☒ **OFF** ☒

ENVIRONMENTAL CONDITIONS

PARAMETER		UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS		CM	*		33	36	
ICE COVER	1Y | 2Y | MY | TOT	TENTHS			10 | | | 10	| | |	
SNOW COVER		CM.					
FLEXURAL STRENGTH		KPa	*		215	445	
COMPRESSIVE STRENGTH		MPa					
FRICTION							
PRESSURE		MPa					
RIDGES							
CRYSTAL							
SALINITY		%					
% BARE ICE		%	*		6.4		
AIR TEMP		DEG C					
WIND SPEED		KNOTS					
WIND DIRN							
ATMOSPHERIC PRESSURE		KPa					
CLOUD COVER		TENTHS					

TRANSIT MODE

CHANNEL / MODE	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING

IN ATTENDANCE

OBJECTIVE To examine speed/power characteristics vs ice thickness

REASON FOR SAMPLING PATTERN To collect a broad range of data for possible subsequent analysis

RECORDING NOTES

MODE **RECORDING** ☒ **HEADER** ☐
STANDBY ☐ **INTERVAL •** **SEC** **EOF** ☐

OMIT CHANNELS:

VIDEO RECORDING TIME VTR = 755 - 770 **TO** **GMT** **PHOTOS •** # **TO**

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-11.5	16:52:00	17:03:59	A_1

COMMENTS -Data acquisition and video systems are set at local time (GMT - 4 hrs)

DEDICATED TRIALS

DATE October 29 - 30th/80

TEST Overnight Recording

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TP 3202

LOCATION Lancaster Sound

LAT: ° 'N

LONG: ° 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 M.
AFT. 10.29 M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS.	EST	RANGE		COMMENTS
ICE THICKNESS	CM					
ICE COVER (1Y, 2Y, MY, TOT)	TENTHS			10	10	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰					
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING

IN ATTENDANCE

OBJECTIVE

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☐

INTERVAL • 30 SEC

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME TO GMT

PHOTOS • # TO

TESTS Tape No.	TIME ON TAPE START	 STOP	Sampling Pattern
80-T2-12.1	20:46:33	04:06:00	B_1

COMMENTS -Data acquisition and video systems set to local time (GMT - 4 hrs)

DEDICATED TRIALS

DATE 30th October 1980	**TEST** Voyage Monitoring

CONTRACTOR Fenco Consultants Ltd. **FINAL REPORT NO.** TP 3202

LOCATION Admiralty Inlet **LAT:** 73 • 29 'N **LONG:** 85 • 11 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 M. **CARGO** ☐ **BUBBLER** 'ON ☒

AFT. 10.29 M. **BALLAST** ☒ **OFF** ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	5	20	
ICE COVER 1Y 2Y MY TOT	TENTHS		*		10 10	New ice with a few multiyear pieces
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING

IN ATTENDANCE

OBJECTIVE

REASON FOR SAMPLING PATTERN To collect a broad range of data for subsequent analysis

RECORDING NOTES

MODE **RECORDING** ☐ **STANDBY** ☒ **INTERVAL =** 30 SEC **HEADER** ☐ **EOF** ☐

OMIT CHANNELS:

VIDEO RECORDING TIME VTR = 834 **TO** **GMT** | **PHOTOS =** **#** **TO**

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-14.1	12:50:16	15:54:00	B_1

COMMENTS - Data acquisition and video systems are set at local time (GMT - 4 hrs)

DEDICATED TRIALS

DATE 30th October 1980

TEST Voyage Monitoring

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TR 3202

LOCATION Admiralty Inlet

LAT: 73 • 29 'N

LONG: 85 • 11 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05M.

AFT. 10.29M.

CARGO ☐

BALLAST ☐

BUBBLER 'ON ☐

OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	5	20	
ICE COVER 1Y 2Y MY TOT	TENTHS		*	10	10	New ice with a few multiyear pieces
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING

IN ATTENDANCE

OBJECTIVE

REASON FOR SAMPLING PATTERN To collect broad range of data for subsequent analysis.

RECORDING NOTES

MODE RECORDING ☐

STANDBY ☒

INTERVAL • SEC

HEADER ☐

EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME VTR = 834

TO GMT

PHOTOS • # TO

TESTS

Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-14.2	15:55:50	16:14:42	A_1

COMMENTS - Bubbler stopped at 15:30:00 GMT

- Data acquisition and video systems are set at local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE 30th October 1980	TEST #28 Ice Impact

CONTRACTOR Fenco Consultants Ltd. FINAL REPORT NO. TR 3202

LOCATION Admiralty Inlet Area 1 LAT: 73 • 19 'N LONG: 85 • 23 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 M. AFT. 10.29 M.

CARGO ☐ BALLAST ☒

BUBBLER 'ON ☐ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM					
ICE COVER 1Y 2Y MY TOT	TENTHS			10	10	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING

IN ATTENDANCE

OBJECTIVE To record structural response to an impact with a large ice fragment.

REASON FOR SAMPLING PATTERN To obtain a broad range of data for possible subsequent analysis.

RECORDING NOTES

MODE RECORDING ☒ STANDBY ☐ INTERVAL = SEC HEADER ☐ EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME TO GMT

PHOTOS = # TO

TESTS Tape No.	TIME ON TAPE START	STOP		Sampling Pattern
80-T2-15.1	16:35:00	16:47:00	(Nudge)	A_1
80-T2-15.2	16:55:00	17:05:31	(Hit)	A_1

COMMENTS Data acquisition and video systems set at local time (GMT - 4 hrs)

DEDICATED TRIALS

DATE 30th October 1980	**TEST** Voyage Monitoring

CONTRACTOR Fenco Consultants Ltd. **FINAL REPORT NO.** TP 3202

LOCATION Admiralty Inlet **LAT:** 73 ° 19 'N **LONG:** 85 ° 23 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 M. **AFT.** 10.29 M.

CARGO ☐ **BALLAST** ☒

BUBBLER ON ☐ **OFF** ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS*	CM					
ICE COVER ☐ 1Y ☐ 2Y ☐ MY ☐ TOT	TENTHS			10	10	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING

IN ATTENDANCE

OBJECTIVE

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE **RECORDING** ☐ **STANDBY** ☐ **INTERVAL =** 30 SEC **HEADER** ☐ **EOF** ☐

OMIT CHANNELS:

VIDEO RECORDING TIME **TO** **GMT** | **PHOTOS =** **#** **TO**

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-15.3	17:21:57	17:35:38	A_1

COMMENTS -Data acquisition and video systems are set at local time (GMT - 4 hrs)

DEDICATED TRIALS

DATE 30th October 1980	**TEST** Voyage Monitoring

CONTRACTOR Fenco Consultants **FINAL REPORT NO.** TP 3202

LOCATION Admiralty Inlet **LAT:** 73 • 19 'N **LONG:** 85 • 23 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 **M.** **CARGO** ☐ **BUBBLER 'ON** ☐
AFT. 10.29 **M.** **BALLAST** ☐ **OFF** ☐

ENVIRONMENTAL CONDITIONS

PARAMETER		UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS		CM					
ICE COVER	1Y 2Y MY TOT	TENTHS			10	10	
SNOW COVER		CM.					
FLEXURAL STRENGTH		KPa					
COMPRESSIVE STRENGTH		MPa					
FRICTION							
PRESSURE		MPa					
RIDGES							
CRYSTAL							
SALINITY		%					
% BARE ICE		%					
AIR TEMP		DEG C					
WIND SPEED		KNOTS					
WIND DIRN							
ATMOSPHERIC PRESSURE		KPa					
CLOUD COVER		TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING

IN ATTENDANCE

OBJECTIVE

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE **RECORDING** ☐ **STANDBY** ☐ **INTERVAL =** 30 SEC **HEADER** ☐ **EOF** ☐

OMIT CHANNELS:

VIDEO RECORDING TIME **TO** **GMT** **PHOTOS =** **#** **TO**

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-15.4	17:47:14	19:00	A_1

COMMENTS - Tape lost vacuum at 19:00 hrs.
- Data acquisition and video systems set at local time (GMT - 4 hrs)

DEDICATED TRIALS

DATE 30th October 1980

TEST Voyage Monitoring

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TR 3202

LOCATION Admiralty Inlet

LAT: 73 • 24 'N
LONG: 85 • 11 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05M.
AFT. 10.29M.

CARGO ☐
BALLAST ☐

BUBBLER 'ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM					
ICE COVER (1Y, 2Y, MY, TOT)	TENTHS			10	10	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING
IN ATTENDANCE

OBJECTIVE

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE **RECORDING** ☐
STANDBY ☒

INTERVAL = 30 SEC

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME TO GMT

PHOTOS = # TO

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-16.1	19:22:50	20:51:03	B_1
80-T2-16.2	20:52:38	21:37:02	B_1

COMMENTS - Data acquisition and video systems are set at local time (GMT - 4 hrs)

DEDICATED TRIALS

DATE 30th October 1980	**TEST** #29 Star Manoeuvre
CONTRACTOR Fenco Consultants Ltd.	**FINAL REPORT NO.** TP 3203

LOCATION Admiralty Inlet Area 2 **LAT:** 73 • 19 'N **LONG:** 85 • 23 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 **M.** **CARGO** ☐ **BUBBLER 'ON** ☐
AFT. 10.29 **M.** **BALLAST** ☒ **OFF** ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS.	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		30	35	
ICE COVER (1Y, 2Y, MY, TOT)	TENTHS		*	10	10	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa	*		215	445	
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES			*			
CRYSTAL						
SALINITY	‰	*		6.4		
‰ BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN	*			
TURNING			*	

ICEBREAKER SUPPORT

NAME:

FOLLOWING

IN ATTENDANCE

OBJECTIVE To examine manoeuvrability vs ice thickness

REASON FOR SAMPLING PATTERN To collect a broad range of data for possible subsequent analysis.

RECORDING NOTES

MODE **RECORDING** ☐ **STANDBY** ☐ **INTERVAL** • **SEC** **HEADER** ☐ **EOF** ☐

OMIT CHANNELS:

VIDEO RECORDING TIME VTR = 770 **TO** **GMT** **PHOTOS** • **#** **TO**

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-13.1	11:09:16	11:40:30	B_1

COMMENTS - Data acquisition and video systems are set at local time (GMT - 4 hrs)

DEDICATED TRIALS

DATE 31 October 1980

TEST #30.1 Speed/Power

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TR 3202

LOCATION Strathcona Sound Area 1

LAT: 73 • 12 'N
LONG: 85 • 10 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 **M.**
AFT. 10.29 **M.**

CARGO ☐
BALLAST ☒

BUBBLER **ON** ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS*	CM	*		33		
ICE COVER (1Y / 2Y / MY / TOT)	TENTHS			10	10	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa	*		340	480	
COMPRESSIVE STRENGTH	MPa	*		16.6		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%	*		5.8		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

CHANNEL / MODE	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING
IN ATTENDANCE

OBJECTIVE To determine speed/power characteristics vs ice thickness

REASON FOR SAMPLING PATTERN To collect a broad range of data for possible subsequent analysis

RECORDING NOTES

MODE **RECORDING** ☒
STANDBY ☐

INTERVAL • **SEC**

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME **TO** **GMT**

PHOTOS • **#** **TO**

TESTS Tape No.	TIME ON TAPE START	TIME ON TAPE STOP	Sampling Pattern
80-T2-17.1	10:01:50	10:07:03	A_2

COMMENTS - Data acquisition and video systems are set at local time (GMT - 4 hrs)

DEDICATED TRIALS

DATE 31st October 1980

TEST #30.2 Speed/Power (Bubbler)

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TP 3202

LOCATION Strathcona Sound Area 1

LAT: 73 • 12 'N
LONG: 85 • 10 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 M.
AFT. 10.29 M.

CARGO ☐
BALLAST ☒

BUBBLER 'ON ☒
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		33		
ICE COVER (1Y 2Y MY TOT)	TENTHS			10 10		
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa	*		340	480	
COMPRESSIVE STRENGTH	MPa	*		16.1		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%	*		6.8		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING
IN ATTENDANCE

OBJECTIVE 1. To determine the speed/power characteristics vs ice thickness
2. To determine the effect of the Bubbler on the above characteristics.

REASON FOR SAMPLING PATTERN 1. To collect a broad range of data for possible subsequent analysis.

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐

INTERVAL * SEC

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME TO GMT

PHOTOS * # TO

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-17.1	10:10:26	10:17:50	A_2

COMMENTS - Data acquisition and video systems are set at local time (GMT - 4 hrs)

DEDICATED TRIALS

DATE 31st October 1980

TEST #31 Speed/Power

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TP 3202

LOCATION Strathcona Sound

LAT: 73 • 12 'N
LONG: 85 • 10 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 M.
AFT. 10.29 M.

CARGO ☐
BALLAST ☒

BUBBLER 'ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		33		
ICE COVER (1Y / 2Y / MY / TOT)	TENTHS			10 / / / 10	/ / /	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa	*		340	480	
COMPRESSIVE STRENGTH	MPa	*		16.1		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%	*		5.8		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING
IN ATTENDANCE

OBJECTIVE 1. To determine speed/power characteristics vs ice thickness

REASON FOR SAMPLING PATTERN To collect a broad range of data for possible subsequent analysis

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐

INTERVAL • SEC

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME TO GMT

PHOTOS • # TO

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-17.2	10:30:10	10:33:00	A_2
80-T2-17.2	10:36:00	10:41:35	A_2

COMMENTS -Data acquisition and video systems are set at local time (GMT-4 hrs.)

DEDICATED TRIALS

DATE 31st October 1980	**TEST** #32.1 Speed/Power (Bubbler)

CONTRACTOR Fenco Consultants Ltd. **FINAL REPORT NO.** TR 3202

LOCATION Strathcona Sound Area 1 **LAT:** 73 ° 12 'N **LONG:** 85 ° 10 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 **M.** **CARGO** ☐ **BUBBLER ON** ☒
AFT 10.29 **M.** **BALLAST** ☒ **OFF** ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		33		
ICE COVER IY 2Y MY TOT	TENTHS			10	10	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa	*		340	480	
COMPRESSIVE STRENGTH	MPa	*		16.1		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰	*		5.8		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING

IN ATTENDANCE

OBJECTIVE 1. To determine the speed/power characteristics vs ice thickness.
2. To determine the effect of the Bubbler on these characteristics.

REASON FOR SAMPLING PATTERN 1. To collect a broad range of data for subsequent analysis.

RECORDING NOTES

MODE **RECORDING** ☒ **STANDBY** ☐ **INTERVAL •** **SEC** **HEADER** ☐ **EOF** ☐

OMIT CHANNELS:

VIDEO RECORDING TIME **TO** **GMT** **PHOTOS •** **#** **TO**

TESTS Tape No.	TIME ON TAPE START	 STOP	Sampling Pattern
80-T2-17.2	10:54:05	14:56:03	A_2

COMMENTS - Data acquisition and video systems are set at local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE 31st October 1980

TEST #32.2 Speed/Power

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TP 3202

LOCATION Strathcona Sound Area 1

LAT: 73 ° 12 'N
LONG: 85 ° 10 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 M.
AFT. 10.29 M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		33		
ICE COVER 1Y 2Y MY TOT	TENTHS			10	10	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa	*		340	480	
COMPRESSIVE STRENGTH	MPa	*		16.1		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%	*		5.8		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING
IN ATTENDANCE

OBJECTIVE 1. To determine speed/power characteristics vs ice thickness

REASON FOR SAMPLING PATTERN 1. To collect a broad range of data for possible subsequent analysis

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐

INTERVAL • SEC

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME TO GMT

PHOTOS • # TO

TESTS Tape No.	TIME ON TAPE START	 STOP	Sampling Pattern
80-T2-17.2	11:03:28	11:06:28	A_2

COMMENTS - Data acquisition and video systems are set at local time (GMT - 4 hrs)

DEDICATED TRIALS

DATE 31st October 1980

TEST #33.1 Speed/Power

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TR 3202

LOCATION Strathcona Sound Area 1

LAT: 73 ° 12 'N
LONG: 85 ° 10 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 M.
AFT. 10.29 M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☒
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		33		
ICE COVER 1Y 2Y MY TOT	TENTHS			10	10	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa	*		340	480	
COMPRESSIVE STRENGTH	MPa	*		16.1		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰	*		5.8		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING
IN ATTENDANCE

OBJECTIVE 1. To determine the power/speed characteristics vs ice thickness.
2. To determine the effect of the Bubbler System on these characteristics.

REASON FOR SAMPLING PATTERN 1. To collect a broad range of data for possible subsequent analysis.

RECORDING NOTES

MODE **RECORDING** ☒
STANDBY ☐

INTERVAL • **SEC**

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME VTR = 592
TO **GMT**

PHOTOS •
**TO**

TESTS Tape No.	TIME ON TAPE START	 STOP	Sampling Pattern
80-T2-18.1	11:24:15	11:27:10	A_2

COMMENTS - computer is 1:06 minutes ahead of VTR
- data acquisition and video systems set at local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE 31st October 1980

TEST #33.2 Speed/Power

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TP 3202

LOCATION Strathcona Sound Area 1

LAT: 73 • 12 'N
LONG: 85 • 10 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 M.
AFT. 10.29 M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		33		
ICE COVER (1Y, 2Y, MY, TOT)	TENTHS			10	10	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa	*		340	480	
COMPRESSIVE STRENGTH	MPa	*		16.1		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%	*		5.8		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING
IN ATTENDANCE

OBJECTIVE 1. To determine the power/speed characteristics vs ice thickness

REASON FOR SAMPLING PATTERN 1. To collect a broad range of data for possible subsequent analysis.

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐

INTERVAL • SEC

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME VTR = 592
TO GMT

PHOTOS •
TO

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-18.1	11:29:15	11:32:26	A_2

COMMENTS - Data acquisition and video systems are set at local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE 31st October 1980

TEST #34.1 Power/Speed

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TP 3202

LOCATION Strathcona Sound Area 1

LAT: 73 • 12 'N
LONG: 85 • 10 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 **M.**
AFT 10.29 **M.**

CARGO ☐
BALLAST ☒

BUBBLER **ON** ☒ **OFF** ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		30		
ICE COVER (1Y, 2Y, MY, TOT)	TENTHS			10 ☐ ☐ 10	☐ ☐ ☐ ☐	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa	*		340	480	
COMPRESSIVE STRENGTH	MPa	*		16.1		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰	*		5.8		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING
IN ATTENDANCE

OBJECTIVE 1. To determine speed/power characteristics vs ice thickness
2. To determine the effect of the Bubbler System on these characteristics

REASON FOR SAMPLING PATTERN 1. To collect a broad range of data for possible subsequent analysis

RECORDING NOTES

MODE **RECORDING** ☒ **STANDBY** ☐

INTERVAL = **SEC**

HEADER ☐ **EOF** ☐

OMIT CHANNELS:

VIDEO RECORDING TIME **TO** **GMT**

PHOTOS = **#** **TO**

TESTS Tape No.	TIME ON TAPE START	 STOP	Sampling Pattern
80-T2-18.1	11:40:18	11:42:29	A_2

COMMENTS - data acquisition and video systems are set at local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE 31st October 1980

TEST #34.2 Power/Speed

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TP 3202

LOCATION Strathcona Sound Area 1

LAT: 73 • 12 'N
LONG: 85 • 10 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 M.
AFT. 10.29 M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		30		
ICE COVER 1Y 2Y MY TOT	TENTHS			10	10	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa	*		340	480	
COMPRESSIVE STRENGTH	MPa	*		16.1		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰	*		5.8		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

CHANNEL / MODE	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING
IN ATTENDANCE

OBJECTIVE 1. To determine power/speed characteristics vs ice thickness

REASON FOR SAMPLING PATTERN 1. To collect a broad range of data for possible subsequent analysis.

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐
INTERVAL • SEC
HEADER ☐
EOF ☐
OMIT CHANNELS:

VIDEO RECORDING TIME TO GMT

PHOTOS • # TO

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-18.1	11:46:00	11:48:27	A_2

COMMENTS - data acquisition and video systems are set at local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE 31st October 1980

TEST #35.1 Power/Speed

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TR 3202

LOCATION Strathcona Sound Area 1

LAT: 73 • 12 'N
LONG: 85 • 10 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 M.
AFT. 10.29 M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☒
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		30		
ICE COVER (1Y, 2Y, MY, TOT)	TENTHS			10 10		
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa	*		340	480	
COMPRESSIVE STRENGTH	MPa	*		16.1		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%	*		5.8		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING
IN ATTENDANCE

OBJECTIVE 1. To determine speed/power characteristics vs ice thickness
2. To determine the effect of the Bubbler System on these characteristics

REASON FOR SAMPLING PATTERN 1. To obtain a broad range of data for possible subsequent analysis

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐

INTERVAL = SEC

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME TO GMT

PHOTOS = # TO

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-18.1	11:56:01	12:02:19	A_2

COMMENTS - data acquisition and video systems are set at local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE 31st October 1980

TEST #35.2 Power/Speed

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TP 3202

LOCATION Strathcona Sound Area 1

LAT: 73 •12 'N
LONG: 85 •10 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 M.
AFT. 10.29 M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		30		
ICE COVER (1Y, 2Y, MY, TOT)	TENTHS			10	10	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa	*		340	480	
COMPRESSIVE STRENGTH	MPa	*		16.1		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰	*		5.8		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING
IN ATTENDANCE

OBJECTIVE 1. To determine power/speed characteristics vs ice thickness

REASON FOR SAMPLING PATTERN 1. To collect a broad range of data for possible subsequent analysis

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐
INTERVAL # SEC
HEADER ☐
EOF ☐
OMIT CHANNELS:

VIDEO RECORDING TIME TO GMT

PHOTOS #
TO

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-18.1	12:06:14	12:11:45	A_2

COMMENTS - data acquisition and video systems are set at local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE
31st October, 1980

TEST .
#36 Star Manoeuvre

CONTRACTOR
Fenco Consultants Ltd.

FINAL REPORT NO. TP 3202

LOCATION
Strathcona Sound Area 1

LAT: 73 • 12 'N
LONG: 85 • 10 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 **M.** **CARGO** ☐ **BUBBLER ON** ☐
AFT. 10.29 **M.** **BALLAST** ☒ **OFF** ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		32		
ICE COVER 1Y 2Y MY TOT	TENTHS			10 10		
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa	*		340	480	
COMPRESSIVE STRENGTH	MPa	*		16.1		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%	*		5.8		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN	*			
TURNING			*	

ICEBREAKER SUPPORT

NAME:
FOLLOWING
IN ATTENDANCE

OBJECTIVE 1 - to determine manoeuverability vs ice thickness

REASON FOR SAMPLING PATTERN 1 - to collect a broad range of data for subsequent analysis

RECORDING NOTES

MODE **RECORDING** ☒ **HEADER** ☐
STANDBY ☐ **INTERVAL** • **SEC** **EOF** ☐
OMIT CHANNELS:

VIDEO RECORDING TIME **TO** **GMT**

PHOTOS • **#** **TO**

TESTS **TIME ON TAPE**
Tape No. **START** **STOP**

No file on tape

COMMENTS

data acquisition and video systems are set at local time (GMT - 4 hrs)

DEDICATED TRIALS

DATE
31st October, 1980

TEST
#37 Docking

CONTRACTOR
Fenco Consultants Ltd.

FINAL REPORT NO. TP 3202

LOCATION
Strathcona Sound Area 1

LAT: 73 • 12 'N
LONG: 85 • 10 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 M.
AFT. 10.29 M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		32		
ICE COVER (1Y, 2Y, MY, TOT)	TENTHS			10 10		
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa	*		340	480	
COMPRESSIVE STRENGTH	MPa	*		16.1		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%	*		5.8		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING			*	

ICEBREAKER SUPPORT

NAME:
FOLLOWING
IN ATTENDANCE

OBJECTIVE

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐

INTERVAL = SEC

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME
15:33:00 TO GMT

PHOTOS =
TO

TESTS TIME ON TAPE
Tape No. START STOP

No file on tape

COMMENTS

Video recording only of docking.

Video system set at local time (GMT - 4 hrs)

DEDICATED TRIALS

DATE 31st October, 1980

TEST #38 Turning Circle

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TP 3202

LOCATION Strathcona Sound

LAT: 73 • 12 'N
LONG: 85 • 10 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05M.
AFT. 10.29M.

CARGO ☐
BALLAST ☑

BUBBLER ON ☑
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	32		
ICE COVER (1Y 2Y MY TOT)	TENTHS			10 ☐ ☐ 10	☐ ☐ ☐ ☐	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa	*		340	480	
COMPRESSIVE STRENGTH	MPa	*		16.1		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰	*		5.8		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING			*	

ICEBREAKER SUPPORT

NAME:

FOLLOWING

IN ATTENDANCE

OBJECTIVE 1 - to determine radius of turning circle
2 - to determine effect of the bubbler on the turning circle

REASON FOR SAMPLING PATTERN
1 - to obtain a broad range of data for possible subsequent analysis.

RECORDING NOTES

MODE **RECORDING** ☑ **STANDBY** ☐

INTERVAL • **SEC**

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME **TO** **GMT**

PHOTOS • # **TO**

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-19.1	18:15:00	18:28:15	A_2

COMMENTS

Helm 30° Starboard

Data acquisition and video systems are set at local time (GMT - 4 hrs)

DEDICATED TRIALS

DATE 31st October 1980	**TEST** # 39.1 Turning Circle
CONTRACTOR Fenco Consultants Ltd.	**FINAL REPORT NO.** TP 3202
LOCATION Strathcona Sound	**LAT:** 73 ° 12 'N **LONG:** 85 ° 10 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 **M.** **CARGO** ☐ **BUBBLER ON** ☐
AFT. 10.29 **M.** **BALLAST** ☒ **OFF** ☒

ENVIRONMENTAL CONDITIONS

PARAMETER		UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS		CM		*	32		
ICE COVER	1Y 2Y MY TOT	TENTHS			10 10		
SNOW COVER		CM.					
FLEXURAL STRENGTH		KPa	*				
COMPRESSIVE STRENGTH		MPa	*		340	480	
FRICTION					16.1		
PRESSURE		MPa					
RIDGES							
CRYSTAL							
SALINITY		‰	*		5.8		
% BARE ICE		%					
AIR TEMP		DEG C					
WIND SPEED		KNOTS					
WIND DIRN							
ATMOSPHERIC PRESSURE		KPa					
CLOUD COVER		TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING			*	

ICEBREAKER SUPPORT

NAME:
FOLLOWING ☐
IN ATTENDANCE ☐

OBJECTIVE 1. To determine turn radius vs ice thickness

REASON FOR SAMPLING PATTERN 1. To gather a broad range of data for possible subsequent analysis.

RECORDING NOTES

MODE **RECORDING** ☒ **STANDBY** ☐ **INTERVAL** * **SEC** **HEADER** ☐ **EOF** ☐

OMIT CHANNELS:

VIDEO RECORDING TIME **TO** **GMT**

PHOTOS * # **TO**

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-19.2	18:46:34	18:50:33	A_2

COMMENTS

Helm 30° Starboard
Data acquisition and video systems are set at local time (GMT - 4 hrs.)

DEDICATED TRIALS

DATE
31st October, 1980

TEST
#39.2 Turning Circle

CONTRACTOR
Fenco Consultants Ltd.

FINAL REPORT NO. TP 3202

LOCATION
Strathcona Sound

LAT: 73 ° 12 'N
LONG: 85 ° 10 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 11.05 M.
AFT. 10.29 M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM		*	32		
ICE COVER 1Y 2Y MY TOT	TENTHS			10	10	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa	*				
COMPRESSIVE STRENGTH	MPa	*		340	480	
FRICTION				16.1		
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰	*		5.8		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING			*	

ICEBREAKER SUPPORT

NAME:
FOLLOWING
IN ATTENDANCE

OBJECTIVE 1 - to determine turn radius vs ice thickness

REASON FOR SAMPLING PATTERN 1 - to gather a broad range of data for possible subsequent analysis

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐
INTERVAL • SEC
HEADER ☐
EOF ☐
OMIT CHANNELS:

VIDEO RECORDING TIME TO GMT

PHOTOS • # TO

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-19.2	18:50:33	19:09:43	A_2

COMMENTS

Helm 30° Starboard
Data acquisition and video systems are set at local time (GMT - 4 hrs)

DEDICATED TRIALS

DATE 31st October, 1980	**TEST** #40 Turning Circle
CONTRACTOR Fenco Consultants Ltd.	**FINAL REPORT NO.** TP 3202
LOCATION Strathcona Sound	**LAT:** 73 • 12 'N **LONG:** 85 • 10 'N

OPERATING CONDITIONS (SHIP)

DRAUGHT **FWD.** 11:05 **M.** **CARGO** ☐ **BUBBLER** **ON** ☒
AFT. 10.29 **M.** **BALLAST** ☒ **OFF** ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		32		
ICE COVER [1Y] [2Y] [MY] [TOT]	TENTHS			10 ☐ ☐ 10	☐ ☐ ☐ ☐	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa	*		340	480	
COMPRESSIVE STRENGTH	MPa	*		16.1		
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰	*		5.8		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING			*	

ICEBREAKER SUPPORT

NAME:

FOLLOWING

IN ATTENDANCE

OBJECTIVE 1 - to determine turn radius vs ice thickness
2 - to determine effect of bubbler on turning circle

REASON FOR SAMPLING PATTERN
1 - to collect a broad range of data for possible subsequent analysis

RECORDING NOTES

MODE **RECORDING** ☒ **STANDBY** ☐ **INTERVAL** • **SEC** **HEADER** ☐ **EOF** ☐

OMIT CHANNELS:

VIDEO RECORDING TIME **TO** **GMT** | **PHOTOS** • **#** **TO**

TESTS Tape No.	TIME ON TAPE START	STOP	Sampling Pattern
80-T2-20.1	19:36:34	19:49:40	A_2

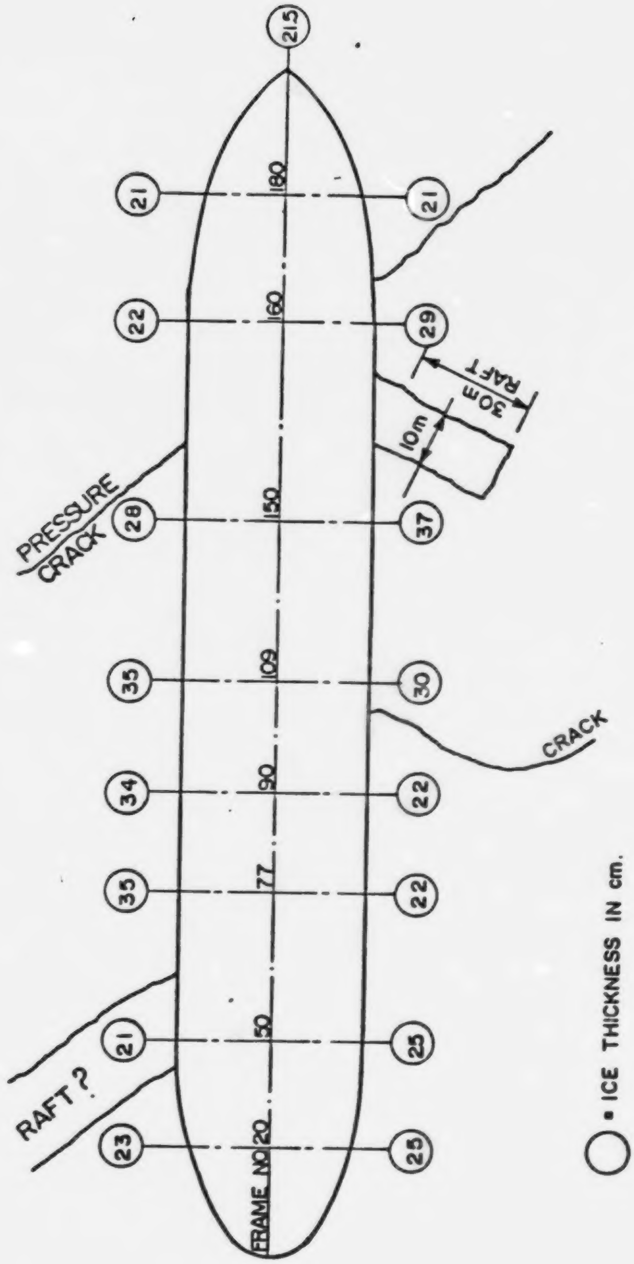
COMMENTS

Helm 30° Starboard

Data acquisition and video systems are set at local time (GMT - 4 hrs)

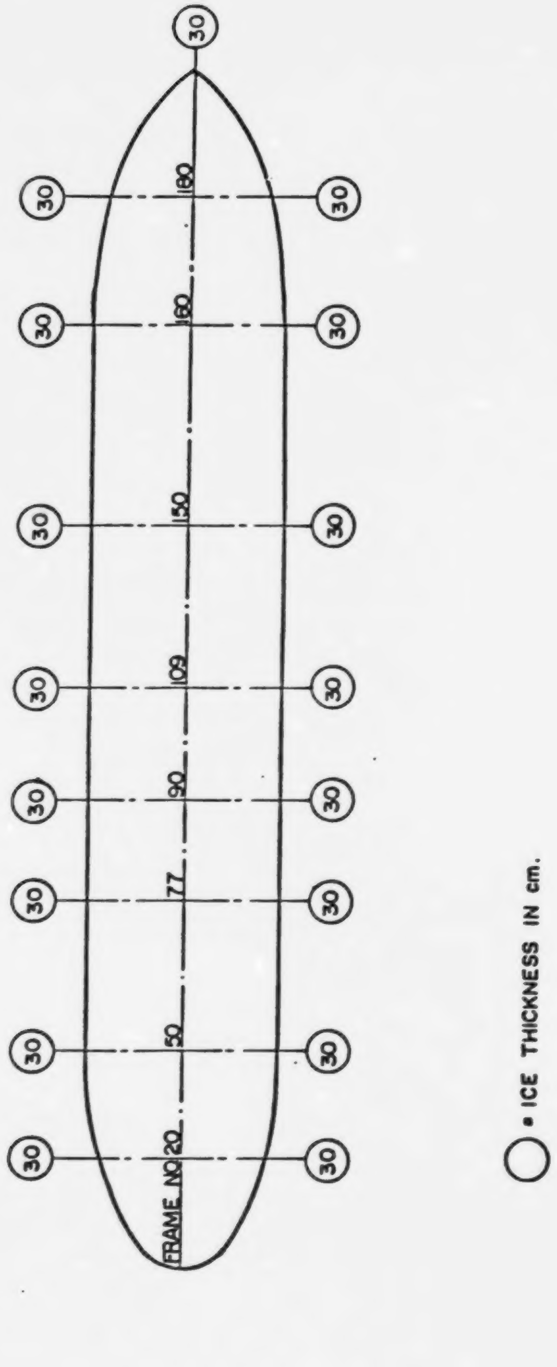
Manually Recorded Data

The information on the following pages was manually recorded by ice observers on Baffin Island Trials. Test numbers used, corresponded to those on the Trials Records. For example, Test 3.5 was one of the runs carried out as part of Test No. 3 in the trials records. The index 5 merely signifies the serial number of the run.


21.5
21
180
21
22
160
29
30m
RAFT
10m
PRESSURE
CRACK
28
150
37
35
109
30
CRACK
34
90
22
35
77
22
21
50
25
RAFT ?
23
FRAME NO 20
25
○ = ICE THICKNESS IN cm.

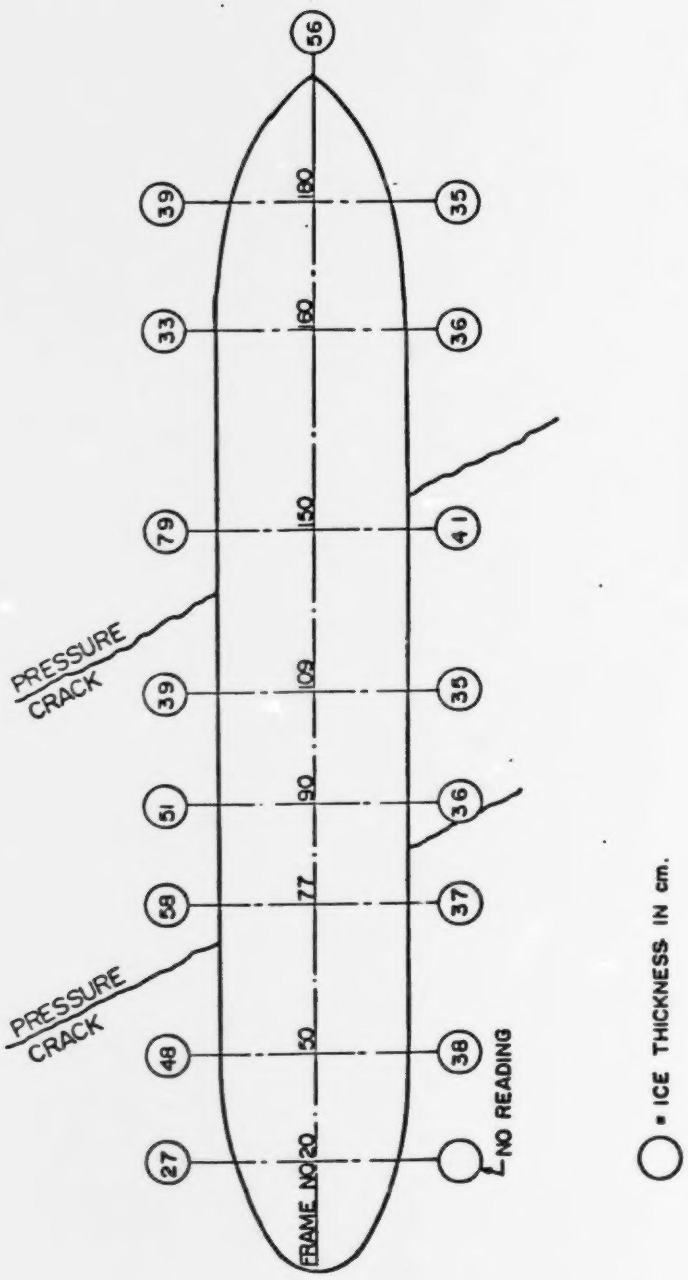
Ice Thickness Measurements prior to "breakout" Test 4.

Figure 3.3


30
30
180
30
30
160
30
30
150
30
30
109
30
30
90
30
30
77
30
30
50
30
30
FRAME NO 20
30
= ICE THICKNESS IN cm.

Ice Thickness Measurements
prior to "breakout" Test 12.

Figure 3.4


56
39
180
35
33
160
36
79
150
41
PRESSURE CRACK
39
109
35
51
90
36
58
77
37
PRESSURE CRACK
48
50
38
NO READING
27
FRAME NO 20
= ICE THICKNESS IN cm.

Ice Thickness Measurements
prior to 'breakout" Test 20.

Figure 3.5

TABLE A.1 MANUALLY RECORDED DATA· POWER / SPEED TESTS

TEST	AREA	DATE	START H	START M	START S	FINISH H	FINISH M	FINISH S	POWER LEVEL	ENGINE RPM	PROP. PITCH NO.	TURBO RPM	TORQUE METER (mV)	LAP TIME (secs)	LAP DIST. (m)	SPEED LOG (knots)	SHIP HEAD (deg.)	ICE THICKNESS (cm)	SNOW COVER (cm)	REMARKS
1.1	NBI(1)	26/10	15	00	02	15	04	53	C4	350	1.9	3500	359	0 120.00 120.00	0 211.8 227.1	2.4	324	13.5 18.0 18.4	0.5	
1.2	NBI(1)	26/10	15	10	14	15	12	36	C6	400	3.0	6500	395	0 60.00 60.00	0 212.3 212.0	5.6	324	17.6 22.0 18.0		
1.3	NBI(1)	26/10	15	16	02	15	18	30	C8	450	4.0	12750		0 60.00 60.00	0 335.6 364.9	9.5	328	18.2 19.0 18.9		
1.4	NBI(1)	26/10	15	23	54	15	26	15		400	5.5	14500		0 60.00 60.00	0 413.0 no read	11.4	328	18.6 18.6 no read		Marker lost.
3.1	NBI(1)	26/10																		Aborted. Wave action breaking ice.
3.2	NBI(1)	26/10	16	02	59	16	05	53		445	4.0	13200		0 60.00 60.00	0 378.3 370.0	10.6	160	22.0 20.0 23.0		
3.3	NBI(1)	26/10	16	13	15	16	15	31	C6	400	3.0	6250	396	0 60.00 60.00	0 239.0 234.7	6.3	160	20.0 19.5 19.0		
3.4	NBI(1)	26/10	16	22	52	16	25	16	C4	360	1.9	4100	256	0 60.00 60.00	0 114.8 120.4	3.0	160	20.3 26.7 20.3		

Figure 3.6

TABLE A.I con't MANUALLY RECORDED DATA· POWER/SPEED TESTS

TEST	AREA	DATE	START			FINISH			POWER LEVEL	ENGINE RPM	PROP. PITCH NO.	TURBO RPM	TORQUE METER (mV)	LAP TIME (secs)	LAP DIST. (m)	SPEED LOG (knots)	SHIP HEAD (deg.)	ICE THICKNESS (cm)	SNOW COVER (cm)	REMARKS
			H	M	S	H	M	S												
3.5	NBI(1)	26/10							C2											Aborted. Vessel Stopped.
6.1	NBI(2)	27/10	14	29	38	14	36	00	C4	350	2.0	4000	360	101.30 91.30 94.70	100.6 100.6 100.6	1.2	245	31.0 31.0 31.5		
6.2	NBI(2)	27/10	14	42	00	14	44	00	C6	400	3.0	7000	396	35.20 34.30	100.6 100.6	4.3	245	32.0 33.0		
6.3	NBI(2)	27/10	14	48	47	17	50	45	C8	400	4.0	13250	760	18.50 missed 20.20	100.6 100.6 100.6	8.2	245	30.5 31.0 30.5	0.5 0.5 0.5	
9.1	NBI(3)	27/10	16	35	14	16	37	00		400	5.0	15000		no read 14.20 14.20	100.6 100.6 100.6	11.4	355	26.0 26.0 27.0	1.0	Bubbler on
9.2	NBI(3)	27/10	16	41	00	16	42	30		440	4.0	13500		19.40 14.20	100.6 100.6	8.1	355	30.0 29.0		
9.3	NBI(3)	27/10	16	45	59	16	47	35	C6	390	3.0	7250		no read 28.20 29.60	100.6 100.6 100.6	5.5	355	28.0 30.0 30.5		
9.4	NBI(3)	27/10	16	53	00	15	55	60	C4	350	1.8	4000		no read no read no read	100.6 100.6 100.6	2.1	355	30.0 28.0 30.0		Bubbler on
10.1	NBI(3)	27/10	17	06	30	17	08	30	C4	350	1.8	4000		no read	100.6	1.5	355	30.0		
10.2	NBI(3)	27/10																		Aborted -no light

Figure 3.7

TABLE A.I con't MANUALLY RECORDED DATA· POWER/SPEED TESTS

TEST	AREA	DATE	START H	START M	START S	FINISH H	FINISH M	FINISH S	POWER LEVEL	ENGINE RPM	PROP. PITCH NO.	TURBO RPM	TORQUE METER (mV)	LAP TIME (secs)	LAP DIST. (m)	SPEED LOG (knots)	SHIP HEAD (deg.)	ICE THICKNESS (cm)	SNOW COVER (cm)	REMARKS
10.3	NBI(3)	27/10	17	19	19	17	23	30	C7	420	3.5	10500		no read		6.7	355	30.0		
10.4	NBI(3)	27/10	17	15	00	17	16	53		410	5.5	15250		no read		9.8	355	30.0		
14.0	NBI(6)	28/10	A.M.							400	5.0	14000		28.30	100.6	9.3		30.0		
														29.10	100.6	6.6		30.0		
														29.60	100.6	6.5		30.0		
										380	5.6	14900		37.70	100.6	5.7		30.0	1.0	Decelerating to stop
15.0	LS(1)	28/10	14	01	40	14	03	15		400	5.6	15400		17.30	100.6	10.8	286	29.0	2.0	
														17.20	100.6	10.8		38.0	2.0	
														16.90	100.6	10.8		33.0	2.0	
														16.90	100.6	10.8		34.0	2.0	
22.0	LS(2)	29/10	9	50	00	9	56	00		360	2.7	5000		50.60	100.6			50.0		Bubbler on
														55.50	100.6			45.0		Bubbler on
														55.80	100.6			51.0		Bubbler on
														55.10	100.6			34.0		Bubbler on
23.0	LS(2)	29/10	9	56	00	10	02	00		360	2.7	5000		63.80	100.6			44.0		Bubbler on
														71.80	100.6			37.0		Bubbler on
														69.90	100.6			lost mark		Bubbler on
														65.40	100.6			lost mark		Bubbler on, pressure relief cracks starting
24.0	LS(2)	29/10	10	47	41	10	51	07		395	3.5	8500		09.00	100.6		70	37.0		
														28.30	100.6			34.0		
														28.20	100.6			34.0		
														28.20	100.6			35.0		

Figure 3.8

TABLE A.1 con't MANUALLY RECORDED DATA· POWER / SPEED TESTS

TEST	AREA	DATE	START H M S	FINISH H M S	POWER LEVEL	ENGINE RPM	PROP. PITCH NO.	TURBO RPM	TORQUE METER (mV)	LAP TIME (secs)	LAP DIST. (m)	SPEED LOG (knots)	SHIP HEAD (deg.)	ICE THICKNESS (cm)	SNOW COVER (cm)	REMARKS
25.0	LS(2)	29/10	10 51 07	10 55 40		395	3.5	8500		27.50 28.30 27.30 30.10 35.70	100.6 100.6 100.6 100.6 100.6		70	36.0 38.0 36.0 31.0 45.0		
27.0	LS(3)	29/10	16 52 00	17 04 30		400	2.6	7000		75.20 65.50 61.60 71.60 60.80	100.6 100.6 100.6 100.6 100.6	3.3 2.3 2.4 2.6 2.8	270	38/33 no read no read no read 36		
30.1	STR(1)	31/10	10 01 20	10 08 00		335	2.6	3500	350	78.74 78.50 77.27 78.33	100.6 100.6 100.6 100.6	2.5	120	33		
30.2	STR(1)	31/10	10 10 26	10 17 50		335	2.6	3500	350	77.56 78.96 79.36 78.91	100.6 100.6 100.6 100.6	2.5 2.4 2.3 2.1	120			Bubbler on Bubbler on Bubbler on Bubbler on
31.1	STR(1)	31/10	10 30 10	10 33 00		395	3.2	8000	515	30.17 29.63 29.43	100.6 100.6 100.6	6.3	120			
31.2	STR(1)	31/10	10 36 00	10 41 35		395	3.2	8000	515	29.50 29.42 29.12	100.6 100.6 100.6	6.6	120			

Figure 3.9

TABLE A.1 con't MANUALLY RECORDED DATA· POWER/SPEED TESTS

TEST	AREA	DATE	START H M S	FINISH H M S	POWER LEVEL	ENGINE RPM	PROP. PITCH NO.	TURBO RPM	TORQUE METER (mV)	LAP TIME (secs)	LAP DIST. (m)	SPEED LOG (knots)	SHIP HEAD (deg.)	ICE THICKNESS (cm)	SNOW COVER (cm)	REMARKS
32.1	STR(1)	31/10	10 54 05	10 56 03		450	4.0	10000	620	24.12	100.6	7.9	120			Bubbler on
										24.05	100.6					
										23.09	100.6					
										23.69	100.6					
32.2	STR(1)	31/10	11 03 28	11 06 28		450	4.0	10000	620	23.71	100.6	7.6	120			
										23.34	100.6					
										23.86	100.6					
										23.47	100.6					
33.1	STR(1)	31/10	11 24 15	11 27 10		415	5.6	15090	975	15.35	100.6	12.0	115			Bubbler on
										15.25	100.6					Bubbler on
										15.04	100.6	12.4				Bubbler on
										15.09	100.6					Bubbler on
										15.03	100.6	12.3				Bubbler on
33.2	STR(1)	31/10	11 29 15	11 32 26		415	5.6	15100	975	15.57	100.6	12.2	110			
										15.27	100.6					
										15.32	100.6					
34.1	STR(1)	31/10	11 40 18	11 42 29		403	4.0	10900	625	22.04	100.6	8.5	105			Bubbler on
										22.13	100.6					Bubbler on
										21.86	100.6	8.4				Bubbler on
										22.14	100.6					Bubbler on
34.2	STR(1)	31/10	11 46 00	11 48 27		403	4.0	11000	625	23.00	100.6	8.5	105			
										23.17	100.6					
										23.43	100.6	8.2				
										23.05	100.6					

Figure 3.10

TABLE A.I con't MANUALLY RECORDED DATA· POWER/SPEED TESTS

TEST	AREA	DATE	START H M S	FINISH H M S	POWER LEVEL	ENGINE RPM	PROP. PITCH NO.	TURBO RPM	TORQUE METER (mV)	LAP TIME (secs)	LAP DIST. (m)	SPEED LOG (knots)	SHIP HEAD (deg.)	ICE THICKNESS (cm)	SNOW COVER (cm)	REMARKS
35.1	STR(1)	31/10	11 56 01	12 02 19		415	2.0	6500	380	47.11	100.6	3.8	105			Bubbler on
										48.55	100.6					Bubbler on
										49.21	100.6	3.6				Bubbler on
										50.71	100.6					Bubbler on
35.2	STR(1)	31/10	12 06 14	12 11 45		415	2.0	3500	380	51.51	100.6	3.6	105			
										51.69	100.6					
										52.53	100.6					
										52.40	100.6					

Figure 3.11

TABLE A.2 MANUALLY RECORDED DATA· TURNING CIRCLE TESTS

TEST	AREA	DATE	START H M S	FINISH H M S	POWER LEVEL	ENGINE RPM	PROP. PITCH NO.	TURBO RPM	TORQUE METER (mV)	LAP TIME (secs)	LAP DIST. (m)	SPEED LOG (knots)	SHIP HEAD (deg.)	ICE THICKNESS (cm)	SNOW COVER (cm)	REMARKS
2	NBI(1)	26/10	15 27 20	15 43 20		400	5.0	15300				11.4 7.2	328 238	18.6	0.5	Turning circle.
17	LS(1)	28/10	15 29 00	15 35 00	C7							8.5 3.2	286 106	See Remarks		Turning circle. Helm 30° S. 10/10-35cm Broken ice & some Ridging.
19	LS(1)	28/10	15 44 00	15 50 00	C7								106 286	See Remarks		Turning circle. Helm 30° S. 10/10-35cm Broken ice & some Ridging.
38	STR(3)	31/10	18 15 00	18 28 15			5.3	16500				13.1 7.0	295 295			Turning circle. Helm 30° S. Bubbler on.
39.1	STR(3)	31/10	18 42 00	18 50 33			5.3	16500				11.9 8.1	250 342			Turning circle. Helm 30° S. Power change due to lub oil.
39.2	STR(3)	31/10	18 50 33	19 09 43			4.0	11500				8.1 5.3	342 86			Turning circle. Helm 30° S.
40	STR(3)	31/10	19 35 55	19 49 40			4.0	12000				7.3 5.6	301 290			Turning circle. Helm 30° S. Bubbler on.
41	STR(3)	31/10														Turning circle - Aborted. Out of ice field.

Figure 3.12

TABLE A3 MANUALLY RECORDED DATA· GENERAL MANOEUVERING TESTS

TEST	AREA	DATE	START H	START M	START S	FINISH H	FINISH M	FINISH S	POWER LEVEL	ENGINE RPM	PROP. PITCH NO.	TURBO RPM	TORQUE METER (mV)	LAP TIME (secs)	LAP DIST. (m)	SPEED LOG (knots)	SHIP HEAD (deg.)	ICE THICKNESS (cm)	SNOW COVER (cm)	REMARKS
4	NBI(1)	27/10	09	22	56	09	24	34	C2	310	0.8	2000					160		1.0	Breakout Test See Sk. for Ice T. Breakout.
			09	24	34	09	27	30	C4	360	1.8	3300								
			09	27	30				C9	375	2.2	4200								
6	NBI(1)	27/10	10	02	39				C6	290	2.6 Rev.	5500		0.00	0		160			Acceleration Astern Broken channel. See T 3. for ice thicknesses.
														60.00	14.33					
														60.00	28.19					
														60.00	48.31					
														60.00	58.07					
														60.00	73.31					
														60.00	84.43					
														60.00	89.00					
														60.00	99.37					
														60.00	102.87					
														60.00	114.00					
														60.00	107.29					
														60.00	118.87					
														60.00	122.23					
														60.00	122.84					
														60.00	122.84					
														60.00	129.24					
														60.00	122.07					
														60.00	126.65					
														60.00	127.56					
					10	22	21							60.00	129.39	5.5				
7	NBI(2)	27/10	15	04	24					400	3.1 Rev.	8500								Backing

Figure 3.13

TABLE A.3 con't MANUALLY RECORDED DATA· GENERAL MANOEUVERING TESTS

TEST	AREA	DATE	START H M S	FINISH H M S	POWER LEVEL	ENGINE RPM	PROP. PITCH NO.	TURBO RPM	TORQUE METER (mV)	LAP TIME (secs)	LAP DIST. (m)	SPEED LOG (knots)	SHIP HEAD (deg.)	ICE THICKNESS (cm)	SNOW COVER (cm)	REMARKS
8	NBI(2)	27/10		16 47 42			4.8					4.8				Track Breakout. Bubbler on. Helm 30° S. See Sk.
11	NBI(4)	28/10	00 06 27	00 07 54			5.3					11.2	310			Kempf Man. Helm 20°P
			00 07 54									9.2	290			
				00 11 19								9.8	330			Helm 20°S
12	NBI(5)	28/10	08 44 16			340	1.3	2500						30		Breakout Test
13	NBI(6)	28/10	A.M.			415	5.5	15750	See Remark			12.2		30 AV		Power Check Q = 565 x 10 ft. lbs
16	LS(1)	28/10	15 17 16		C7	415			660	0	0			33/39		Accel. Clogged Channel Ice T see T15
			15 18 30							64.00						
			15 19 27						660	38.30						
			15 20 15							31.30						
			15 20 58							27.20						
			15 21 36						630	24.90						
			15 22 13							23.60						
			15 22 48							22.90						
			15 23 20						605	22.40						
			15 23 54							22.10						
			15 25 00						560							
18	LS(1)	28/10	15 55 00	16 00 00		430	3.6	11400		19.50	110.6	10.9				Pwr/Speed Broken Channel Ice T See T15
										19.20	110.6	10.6				
										20.20	110.6	9.7				
										20.60	110.6	9.0				
										20.80	110.6	8.5				

Figure 3.14

TABLE A3 con't MANUALLY RECORDED DATA· GENERAL MANOEUVERING TESTS

TEST	AREA	DATE	START H M S	FINISH H M S	POWER LEVEL	ENGINE RPM	PROP. PITCH NO.	TURBO RPM	TORQUE METER (mV)	LAP TIME (secs)	LAP DIST. (m)	SPEED LOG (knots)	SHIP HEAD (deg.)	ICE THICKNESS (cm)	SNOW COVER (cm)	REMARKS
20	LS(2)	29/10	08 22 00 08 25 00 08 28 00 08 31 00	 08 33 00		335 340 395 390	0.75 2.30 2.30 2.90	2500 3500 5000 6000	 440				250			Breakout Test See Sk. for Ice T.
21	LS(2)	29/10	09 05 23	09 10 00		350	1.40	3600								Backing in Frozen Channel
26	LS(2)	29/10	13 43 31	13 47 10		380	3.30	9500								Backing in sheet ice
28	AI(1)	30/10	16 35 00													Impact Data Aqu Computer
29	AI(2)	30/10	11 09 16	11 40 30									168 348	13		"Star" Manoeuver See Sk.
36	STR(1)	31/10	14 10 02	14 55 20									107 287	32		"Star" Manoeuver Area 0.32 - 0.50 k.
37	STR(2)	31/10	15 25 49	16 20 03												Docking at Nanisivk See Text.

Figure 3.15

3.4 LAKE MELVILLE TRIALS - 1981

LAKE MELVILLE TRIALS 1981

The Lake Meville Trials were conducted by Melville Shipping Ltd. and Fenco Consultants Ltd., between 27 February 1981 and 3 March 1981. Nine (9) sets of tests were carried out during which seventeen (17) data tapes were recorded.

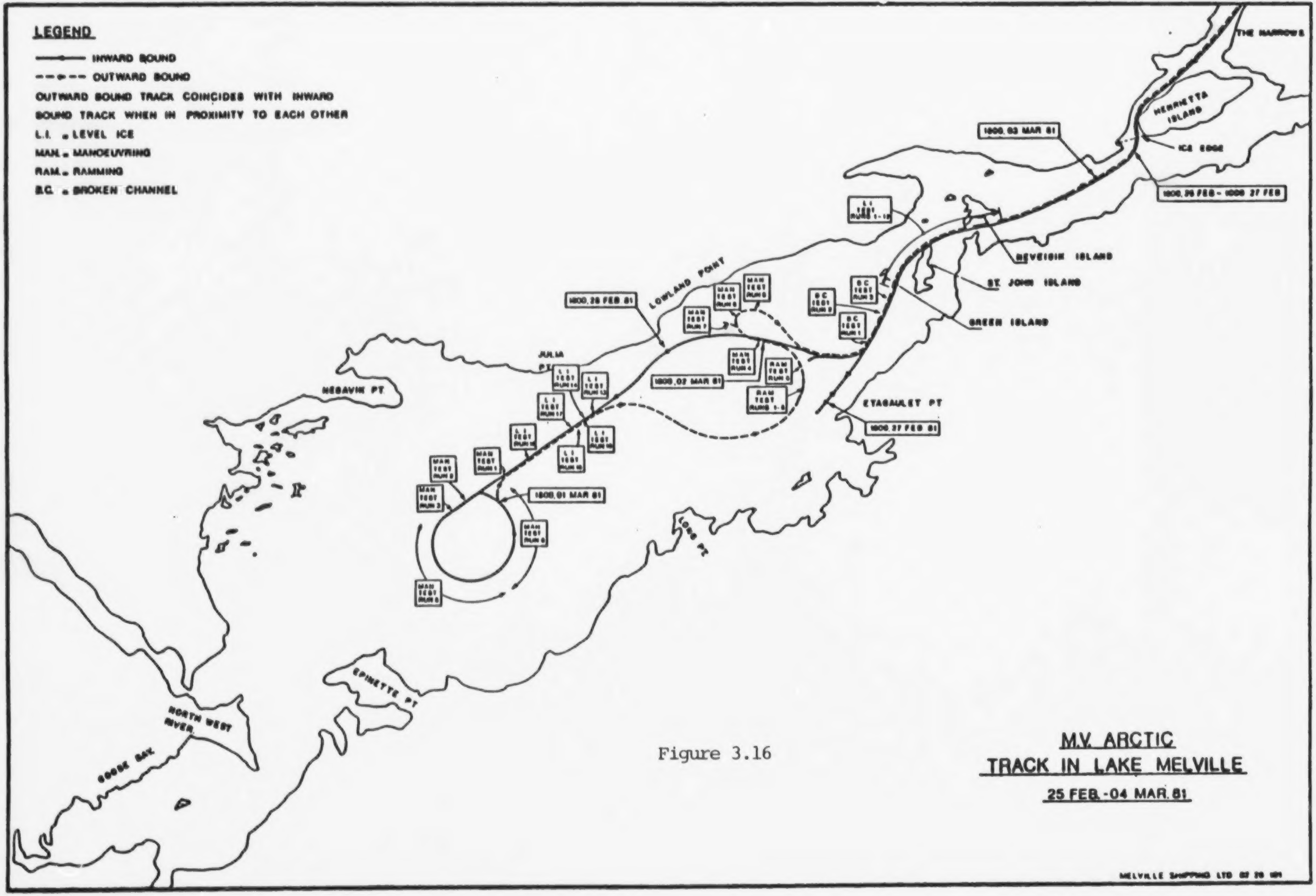
Due to confidentiality of the data, the Trials Record Sheets have not included much of the ice/meteorological data observed during the trials. However, the sheets do indicate (with an asterisk) parameters that were recorded. Complete information, including the actual values of these parameters may be found in the M.V. ARCTIC Special Report on Lake Melville Probe, August 1982, prepared by Melville Shipping Ltd. for Transportation Development Centre.

TEST INDEX

LAKE MELVILLE TRIALS 1981

NO.	TEST
1	Speed/Power No. 1
2	Speed/Power No. 2
3	Rudder Angle Sensitivity
4	Level Ice Ramming
5	Ridge Ramming
6	Hull, Propeller Shafting and Rudder Stock Vibration
7	Channel Breakout
8	Turning Circle
9	Broken Channel Speed/Power

Seventeen (17) data tapes and seven (7) video tapes were recorded during this Dedicated Trial.


LEGEND
INWARD BOUND
OUTWARD BOUND
OUTWARD BOUND TRACK COINCIDES WITH INWARD BOUND TRACK WHEN IN PROXIMITY TO EACH OTHER
L.I. = LEVEL ICE
MAN. = MANOEUVRING
RAM. = RAMMING
B.C. = BROKEN CHANNEL
THE NARROWS
HENRIETTA ISLAND
ICE EDGE
1800, 03 MAR 81
1800, 26 FEB - 1000 27 FEB
L.I. TEST RUNS 1-12
REVEIDIK ISLAND
ST. JOHN ISLAND
GREEN ISLAND
B.C. TEST RUN 3
B.C. TEST RUN 2
B.C. TEST RUN 1
LOWLAND POINT
1800, 28 FEB 81
MAN TEST RUN 8
MAN TEST RUN 6
MAN TEST RUN 7
MAN TEST RUN 4
RAM TEST RUN 6
RAM TEST RUNS 1-5
1800, 02 MAR 81
ETAGAULET PT
1800, 27 FEB 81
JULIA PT
L.I. TEST RUN 14
L.I. TEST RUN 13
L.I. TEST RUN 17
L.I. TEST RUN 15
L.I. TEST RUN 16
L.I. TEST RUN 18
MAN TEST RUN 1
MAN TEST RUN 2
MAN TEST RUN 3
MAN TEST RUN 6
MAN TEST RUN 5
1800, 01 MAR 81
MESAVIK PT.
LONG PT.
EPINETTE PT
NORTH WEST RIVER
GOOSE BAY
MELVILLE SHIPPING LTD 02 26 181

M.V. ARCTIC
TRACK IN LAKE MELVILLE
25 FEB.-04 MAR.81

Figure 3.16

SAMPLING PATTERNS

Lake Melville Trials

Channel Number	A	B	A_1	B_1
1	3R	3R	3R	3R
2	3R	3R	3R	3R
3				
4				
5				
6				
7				
8				
9				
10				
11	3R	3R	3R	3R
12	3R	3R	3R	3R
13	3R	3R	3R	3R
14				
15				
16				
17				
18				
19	2P	2P	2P	2P
20	2P	2P	2P	2P
21	2P	2P	2P	2P
22				
23				
24				
25				
26	2P	2P	2P	2P
27				
28				
29	2P	2P	2P	2P
30				
31	3R	3R	3R	3R

SAMPLING PATTERNS

Lake Melville Trials

Channel Number	A	B	A_1	B_1
32				
33	2P	2P	2P	2P
34	2P	2P	2P	2P
35	2P	2P	2P	2P
36	2P	2P	2P	2P
37	2P	2P	2P	2P
38	2P	2P	2P	2P
39	2P	2P	2P	2P
40	2P	2P	2P	2P
41				
42	2P	2P	2P	2P
43	2P	2P	2P	2P
44				
45	2P	2P	2P	2P
46	2P	2P	2P	2P
47				
48	2P	2P	2P	2P
49	2P	2P	2P	2P
50	2P	2P	2P	2P
51	2P	2P	2P	2P
52				
53	5R		5R	
54	2P	2P	2P	2P
55	2P	2P	2P	2P
56				
57	2P	2P	2P	2P
58	2P	2P	2P	2P
59	2P	2P	2P	2P
60	2P	2P	2P	2P
61				
62				

SAMPLING PATTERNS

Lake Melville Trials

Channel Number	A	B	A_1	B_1
63	2P	2P	2P	2P
64	5R		5R	
65	5R		5R	
66	2P	2P	2P	2P
67	2P	2P	2P	2P
68	2P	2P	2P	2P
69	2P	2P	2P	2P
70	2P	2P	2P	2P
71	2P	2P	2P	2P
72	2P	2P	2P	2P
73	2P	2P	2P	2P
74	2P	2P	2P	2P
75	2P	2P	2P	2P
76				
77				
78	2P	2P	2P	2P
79				
80	2P	2P	2P	2P
81	2P	2P	2P	2P
82	2P	2P	2P	2P
83	2P	2P	2P	2P
84				
85	2P	2P	2P	2P
86	2P	2P	2P	2P
87				
88				
89	2P	2P	2P	2P
90	2P	2P	2P	2P
91	2P	2P	2P	2P
92				
93				

SAMPLING PATTERNS

Lake Melville Trials

Channel Number	A	B	A_1	B_1
94				
95	2P	2P	2P	2P
96				
97	2P	2P	2P	2P
98	2P	2P	2P	2P
99				
100				
101	2P	2P	2P	2P
102				
103				
104	2P	2P	2P	2P
105	2P	2P	2P	2P
106	2P	2P	2P	2P
107	5R		5R	
108	2P	2P	2P	2P
109	5R		5R	
110	2P	2P	2P	2P
111	2P	2P	2P	2P
112				
113	2P	2P	2P	2P
114				
115				
116				
117	2P	2P	2P	2P
118	2P	2P	2P	2P
119				
120	2P	2P	2P	2P
121	2P	2P	2P	2P
122				
123				
124				

SAMPLING PATTERNS

Lake Melville Trials

Channel Number	A	B	A_1	B_1
125	5R		5R	
126	2P	2P	2P	2P
127	2P	2P	2P	2P
128	2P	2P	2P	2P
129	2P	2P	2P	2P
130				
131				
132	2P	2P	2P	2P
133	2P	2P	2P	2P
134	2P	2P	2P	2P
135				
136				
137				
138	2P	2P	2P	2P
139				
140				
141				
142				
143				
144				
145	2P	2P	2P	2P
146				
147	2P	2P	2P	2P
148	2P	2P	2P	2P
149				
150				
151				
152	2P	2P	2P	2P
153	2P	2P	2P	2P
154				
155	2P	2P	2P	2P

SAMPLING PATTERNS

Lake Melville Trials

Channel Number	A	B	A_1	B_1
156				
157	2P	2P	2P	2P
158	2P	2P	2P	2P
159				
160	2P	2P	2P	2P
161	2P	2P	2P	2P
162	2P	2P	2P	2P
163	2P	2P	2P	2P
164	5R		5R	
165	5R		5R	
166	2P	2P	2P	2P
167				
168				
169	2P	2P	2P	2P
170				
171				
172				
173	5R		5R	
174	2P	2P	2P	2P
175				
176				
177				
178				
179				
180				
187				
188				
196				
198	2R	2R	2R	2R
199	2R	2R	2R	2R
200	2R	2R	2R	2R

SAMPLING PATTERNS

Lake Melville Trials

Channel Number	A	B	A_1	B_1
201	2R	2R	2R	2R
202	2R	2R	2R	2R
203				
204				
205				
206				
207				
208	2R	2R	2R	2R
211	2R	2R	2R	2R
212	3R	3R	3R	3R
213	3R	3R	3R	3R
214	3R	3R	3R	3R
215	3R	3R	3R	3R
216	3R	3R	3R	3R
217	3R	3R	3R	3R
224				
225				
226				
227				
228				
229				
230				
231				
232				
233	2R	2R	2R	2R
234	2R	2R	2R	2R
235				
236	2R	2R	2R	2R
237	2R	2R	2R	2R
238	2R	2R	2R	2R
239			2R	2R

SAMPLING PATTERNS

Lake Melville Trials

Channel Number	A	B	A_1	B_1
240			2R	2R
241				
242				
243				
244	2R	2R	2R	2R
245	2R	2R	2R	2R
246				
247				
248				
249				
250				
251				
252				
253				
254				
255				

DEDICATED TRIALS

DATE	TEST
27th February, 1981	1: Speed/Power #1

CONTRACTOR Melville Shipping Ltd.
Fenco Consultants Ltd.

FINAL REPORT NO. TP 3809E
3637

LOCATION Sailing from Henrietta Island to Etagaulet Point

LAT: 54 • 56 'N
LONG: 58 • 54 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 10.8 M.
AFT. 10.8 M.

CARGO ☐
BALLAST ☑

BUBBLER ON ☑
OFF ☑

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM	*			
ICE COVER 1Y 2Y MY TOT	TENTHS	*			Also measured:
SNOW COVER	CM.	*			Ice temperature profile
FLEXURAL STRENGTH	KPa	*			Water Depth
COMPRESSIVE STRENGTH	MPa	*			Visibility
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL		*			
SALINITY	%	*			
% BARE ICE	%				
AIR TEMP	DEG C	*			
WIND SPEED	KNOTS	*			
WIND DIRN		*			
ATMOSPHERIC PRESSURE	KPa	*			
CLOUD COVER	TENTHS				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING ☐

IN ATTENDANCE ☐

OBJECTIVE Conduct speed/power tests at various power settings with bubbler system on and off.

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE RECORDING ☑
STANDBY ☐

INTERVAL * SEC

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME V1
11:08 TO 13:35 GMT

PHOTOS *
TO

TESTS Tape No.	TIME ON TAPE START	STOP	Contractor Tape No.	Run No.	Sampling Pattern
81-T1-8,2	11:08	12:10	C8	1-7	B
81-T1-9.2	12:45	13:35	C9	8-12	B

COMMENTS

DEDICATED TRIALS

DATE 1st March 1981	**TEST** 2: Speed/Power #2

CONTRACTOR Melville Shipping Ltd.
Fenco Consultants Ltd.

FINAL REPORT NO. TP 3809E
3637

LOCATION Sailing from Lowland Point to Nebavik Point to Julia Point

LAT: ° 'N
LONG: ° 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 10.8 **M.**
AFT. 10.8 **M.**

CARGO ☐
BALLAST ☒

BUBBLER ON ☒
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*				Also measured:
ICE COVER 1Y 2Y MY TOT	TENTHS	*				Ice temperature profile
SNOW COVER	CM.	*				Water Depth
FLEXURAL STRENGTH	KPa	*				
COMPRESSIVE STRENGTH	MPa	*				
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL		*				
SALINITY	%	*				
% BARE ICE	%					
AIR TEMP	DEG C	*				
WIND SPEED	KNOTS	*				
WIND DIRN		*				
ATMOSPHERIC PRESSURE	KPa	*				
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING ☐

IN ATTENDANCE ☐

OBJECTIVE Speed/power tests at various engine power/combinator positions with bubbler system on and off.

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE **RECORDING** ☒
STANDBY ☐

INTERVAL ▪ **SEC**

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME V3
09:44 **TO** 12:20 **GMT**

PHOTOS ▪
**TO**

TESTS Tape No.	TIME ON TAPE START	 STOP	Contractor Tape No.	 Run No.	Sampling Pattern
81-T1-11.2	09:24	10:30	C11	13-17	B_1
81-T1-12.2	12:11	12:20	C12	18	B_1

COMMENTS

DEDICATED TRIALS

DATE 1st March, 1981	**TEST** 3: Rudder Angle Sensitivity

CONTRACTOR Melville Shipping Ltd.
Fenco Consultants Ltd.

FINAL REPORT NO. TP 3809E
3637

LOCATION Sailing from Lowland Point to
Nabavik Point to Julia Point

LAT: 53 • 42 'N
LONG: 59 • 44 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 10.8 M.
AFT. 10.8 M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☒
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM	*			Also measured: Water depth
ICE COVER (1Y 2Y MY TOT)	TENTHS	*			
SNOW COVER	CM.	*			
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa	*			
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				
% BARE ICE	%				
AIR TEMP	DEG C				
WIND SPEED	KNOTS	*			
WIND DIRN		*			
ATMOSPHERIC PRESSURE	KPa	*			
CLOUD COVER	TENTHS				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING			*	

ICEBREAKER SUPPORT

NAME:
FOLLOWING ☐
IN ATTENDANCE ☐

OBJECTIVE Turning Tests at full power and various rudder angles with the bubbler system on and off.

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐

INTERVAL • SEC

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME V3
13:40 TO 14:45 GMT

PHOTOS •
TO

TESTS Tape No.	TIME ON TAPE START	STOP	Contractor Tape No.	Run No.	Sampling Pattern
81-T1-12.2	13:40	14:45	C12	1-3	B_1

COMMENTS

DEDICATED TRIALS

DATE 2nd March, 1981

TEST 4: Level Ice Ramming

CONTRACTOR Melville Shipping Ltd.
Fenco Consultants Ltd.

FINAL REPORT NO. TP 3809E
3637

LOCATION Sailing from Julia Point to Etagaulet Point

LAT: 53 • 48 'N
LONG: 59 • 08 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 10.8 M.
AFT. 10.8 M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☒
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*				Also measured:
ICE COVER 1Y 2Y MY TOT	TENTHS	*				Ice temperature profile
SNOW COVER	CM.					Water Depth
FLEXURAL STRENGTH	KPa					Visibility
COMPRESSIVE STRENGTH	MPa	*				
FRICTION						
PRESSURE	MPa					
RIDGES		*				
CRYSTAL		*				
SALINITY	‰	*				
% BARE ICE	%					
AIR TEMP	DEG C	*				
WIND SPEED	KNOTS	*				
WIND DIRN		*				
ATMOSPHERIC PRESSURE	KPa	*				
CLOUD COVER	TENTHS					

TRANSIT MODE

CHANNEL / MODE	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING ☐
IN ATTENDANCE ☐

OBJECTIVE Level ice ramming at various power setting. Obtain penetration distance as function of ice characteristics and ship's speed and power.

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐

INTERVAL * SEC

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME V4
14:16 TO 14:54 GMT

PHOTOS *
TO

TESTS Tape No.	TIME ON TAPE START	STOP	Contractor Tape No.	Run No.	Sampling Pattern
81-T1-14.2	14:16	14:18	C14	1	A_1
81-T1-14.3	14:23	14:25	C14	2	A_1
81-T1-14.4	14:32	14:35	C14	3	A_1
81-T1-14.5	14:45	14:49	C14	4	A_1
81-T1-14.6	14:51	14:54	C14	5	A_1

COMMENTS

DEDICATED TRIALS

DATE 2nd March, 1981	**TEST** 5: Ridge Ramming

CONTRACTOR Melville Shipping Ltd.
Fenco Consultants Ltd.

FINAL REPORT NO. **TP** 3809E
3637

LOCATION Sailing from Julia Point to Etagaulet Point

LAT: 53 ° 49 'N
LONG: 59 ° 07 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 10.8 **M.**
AFT. 10.8 **M.**

CARGO ☐
BALLAST ☒

BUBBLER **ON** ☐ **OFF** ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM	*			5 rams required to penetrate ridge. Also measured: Ridge consolidation depth Water Depth Visibility
ICE COVER 1Y 2Y MY TOT	TENTHS	*			
SNOW COVER	CM.	*			
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa	*			
FRICTION					
PRESSURE	MPa				
RIDGES		*			
CRYSTAL		*			
SALINITY	‰	*			
% BARE ICE	%				
AIR TEMP	DEG C	*			
WIND SPEED	KNOTS	*			
WIND DIRN		*			
ATMOSPHERIC PRESSURE	KPa	*			
CLOUD COVER	TENTHS				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING ☐

IN ATTENDANCE ☐

OBJECTIVE Ridge ramming at full power with bubbler system off.

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE **RECORDING** ☒ **STANDBY** ☐

INTERVAL = **SEC**

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME V4
15:46 **TO** 15:50 **GMT**

PHOTOS =
**TO**

TESTS Tape No.	TIME ON TAPE START	STOP	Contractor Tape No.	Run No.	Sampling Pattern
81-T1-14.7	15:48	15:50	C14	6	B_1

COMMENTS

DEDICATED TRIALS

DATE 2nd March, 1981

TEST 6: Hull, Propeller Shafting and Rudder Stock Vibration

CONTRACTOR Melville Shipping Ltd.
Fenco Consultants Ltd.

FINAL REPORT NO. TP 3809E
3637

LOCATION Sailing from Julia Point to Etagaulet Point

LAT: ° 'N
LONG: ° 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 10.8 M.
AFT. 10.8 M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM				
ICE COVER 1Y 2Y MY TOT	TENTHS				
SNOW COVER	CM.				
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				
% BARE ICE	%				
AIR TEMP	DEG C				
WIND SPEED	KNOTS				
WIND DIRN					
ATMOSPHERIC PRESSURE	KPa				
CLOUD COVER	TENTHS				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING ☐
IN ATTENDANCE ☐

OBJECTIVE Investigate vibratory behaviour of the propeller shaft and rudder stock.

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE RECORDING ☐
STANDBY ☐
INTERVAL SEC
HEADER ☐
EOF ☐
OMIT CHANNELS:

VIDEO RECORDING TIME TO GMT

PHOTOS # TO

TESTS Tape No.

TIME ON TAPE START STOP

No tape recording

COMMENTS

Analog signals from accelerometers amplified and recorded on magnetic tape by 14-channel Ampex FM tape recorder.

DEDICATED TRIALS

DATE 3rd March, 1981

TEST 7: Channel Breakout

CONTRACTOR Melville Shipping Ltd.
Fenco Consultants Ltd.

FINAL REPORT NO. TP 3809E
3637

LOCATION Sailing from Etagaulet Point to Neveikik Island

LAT: 53 ° 51 'N
LONG: 59 ° 12 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 10.8 M.
AFT. 10.8 M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☒
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE	COMMENTS
ICE THICKNESS	CM	*			Also measured: Visibility
ICE COVER (1Y / 2Y / MY / TOT)	TENTHS	*			
SNOW COVER	CM.	*			
FLEXURAL STRENGTH	KPa				
COMPRESSIVE STRENGTH	MPa				
FRICTION					
PRESSURE	MPa				
RIDGES					
CRYSTAL					
SALINITY	%				
% BARE ICE	%				
AIR TEMP	DEG C	*			
WIND SPEED	KNOTS	*			
WIND DIRN		*			
ATMOSPHERIC PRESSURE	KPa	*			
CLOUD COVER	TENTHS				

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS			*	
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING ☐
IN ATTENDANCE ☐

OBJECTIVE Turning tests at full power with 5 degree heel and bubbler system on.

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐

INTERVAL = SEC

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME V5
TO
GMT

PHOTOS =
TO

TESTS Tape No.	TIME ON TAPE START	STOP	Contractor Tape No.	Run No.	Sampling Pattern
81-T1-14.10	08:19	08:24	C14	4	B_1

COMMENTS

DEDICATED TRIALS

DATE 1st March, 1981
3rd March, 1981

TEST
8: Turning Circle

CONTRACTOR Melville Shipping Ltd.
Fenco Consultants Ltd.

FINAL REPORT NO. TP 3809E
3637

LOCATION Sailing from Etagaulet Point to Neveisik Island

LAT: 53 ° 'N
LONG: 59 ° 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 10.8 M.
AFT. 10.8 M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☒
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*				Also measured Visibility
ICE COVER 1Y 2Y MY TOT	TENTHS	*				
SNOW COVER	CM.	*				
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa	*				
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL		*				
SALINITY	‰	*				
% BARE ICE	%					
AIR TEMP	DEG C	*				
WIND SPEED	KNOTS	*				
WIND DIRN		*				
ATMOSPHERIC PRESSURE	KPa	*				
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING				
ASTERN				
TURNING			*	

ICEBREAKER SUPPORT

NAME:

FOLLOWING ☐

IN ATTENDANCE ☐

OBJECTIVE Turning tests at full power with 5 degree heel and bubbler system on.

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐

INTERVAL = SEC

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME V3, V5
TO GMT

PHOTOS =
TO

TESTS Tape No.	TIME ON TAPE START	STOP	Contractor Tape No.	Run No.	Sampling Pattern
81-T1-12.2	14:47	15:12	C12	5	B_1
81-T1-13.2	17:04	18:03	C13	6	B_1
81-T1-15.1	10:16	10:34	C15	8	B_1
81-T1-15.2	10:34	10:42	C15	8	B_1

COMMENTS

DEDICATED TRIALS

DATE 3rd March, 1981	**TEST** 9: Broken Channel Speed/Power

CONTRACTOR Melville Shipping Ltd.
Fenco Consultants Ltd.

FINAL REPORT NO. TP 3809E
3637

LOCATION Sailing from Etagaulet Point to Neveisik Island

LAT: 54 ° 53 ' N
LONG: 59 ° 00 ' W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. 10.8 M.
AFT 10.8 M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*				Also measured: Visibility
ICE COVER (1Y / 2Y / MY / TOT)	TENTHS	*				
SNOW COVER	CM.	*				
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%					
% BARE ICE	%					
AIR TEMP	DEG C	*				
WIND SPEED	KNOTS	*				
WIND DIRN		*				
ATMOSPHERIC PRESSURE	KPa	*				
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS	*			
RAMMING				
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING ☐

IN ATTENDANCE ☐

OBJECTIVE Speed/Power tests in broken channel at various power settings with bubbler system off.

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐

INTERVAL * **SEC**

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME V7
15:35 **TO** 15:41 **GMT**

PHOTOS *
**TO**

TESTS Tape No.	TIME ON TAPE START	TIME ON TAPE STOP	Contractor Tape No.	Contractor Run No.	Sampling Pattern
81-T1-16.2	03:38	03:41	C16	1	B_1
81-T1-16.2	03:07	03:11	C16	2	B_1
81-T1-16.2	03:20	03:25	C16	3	B_1

COMMENTS

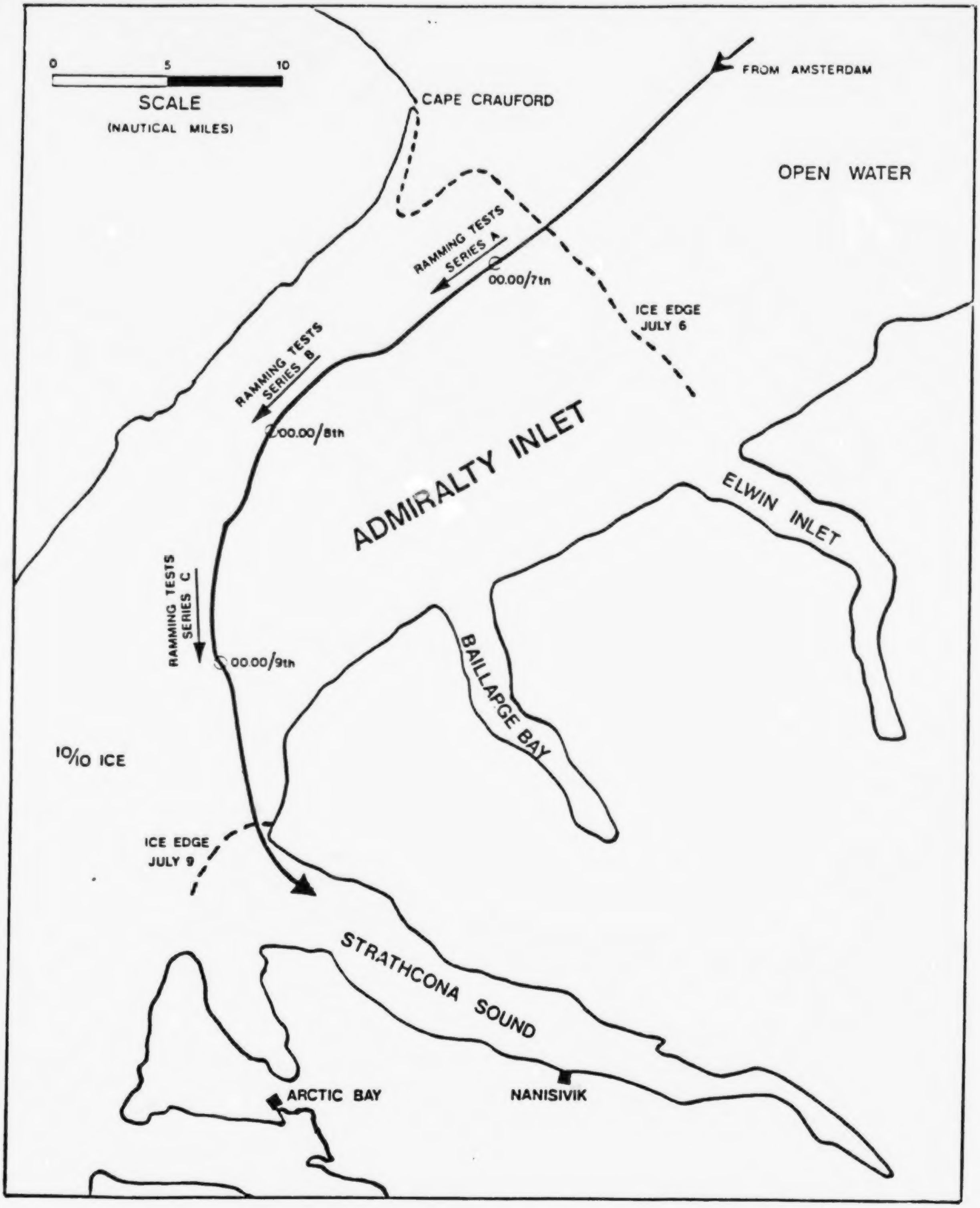
Tape times are local minus 12 h.

3.5 ADMIRALTY INLET TRIALS - 1981

TEST INDEX
ADMIRALTY INLET TRIALS 1981

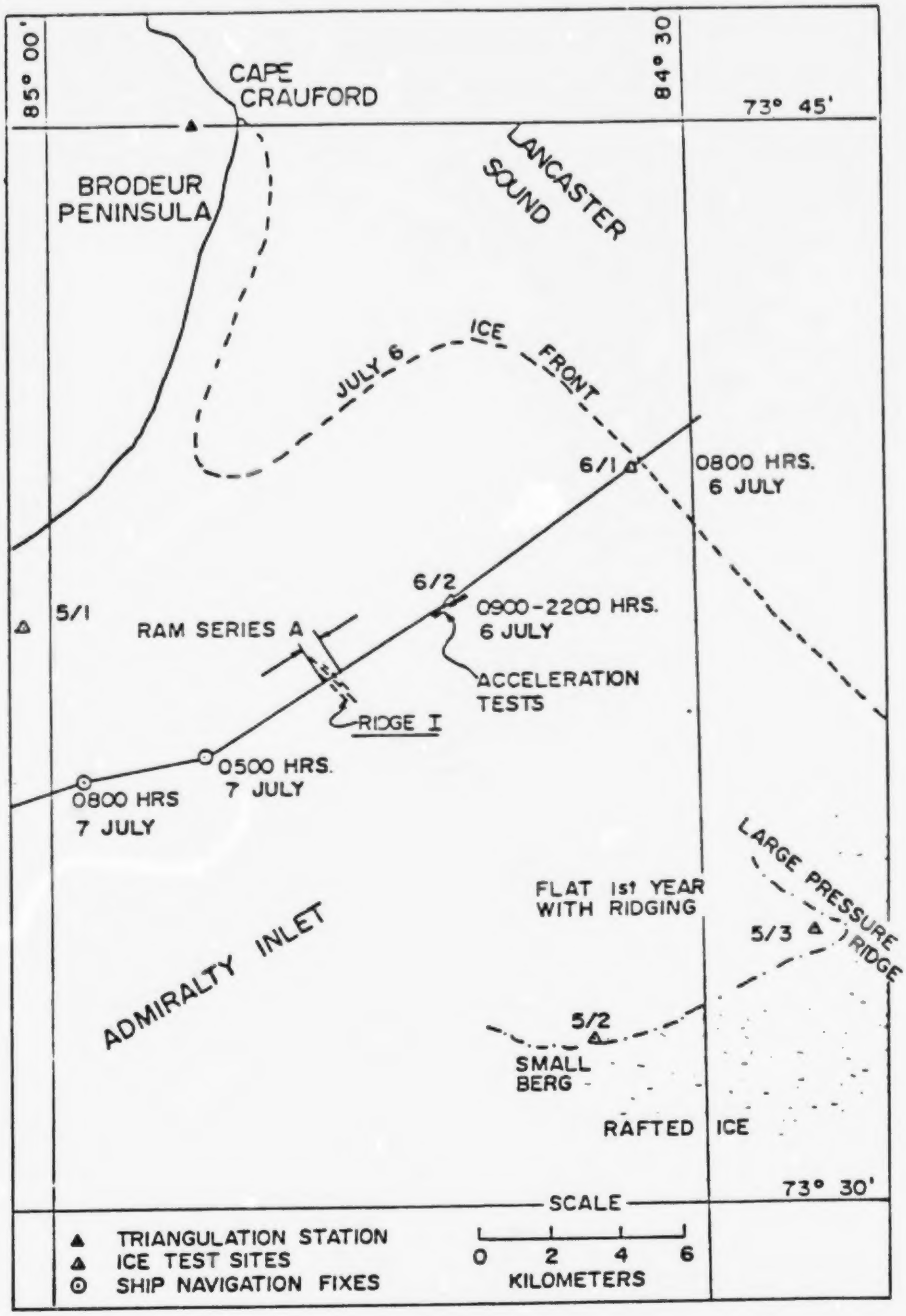
NO.	TEST
1	Ramming Test No. 1
2	Ramming Test No. 2
3	Ramming Test No. 3
4	Ramming Test No. 4
5	Ramming Test No. 5
6	Ramming Test No. 6
7	Ramming Test No. 7
8	Ramming Test No. 8
9	Ramming Test No. 9
10	Ramming Test No. 10
11	Ramming Test No. 11
12	Ramming Test No. 12
13	Ramming Test No. 13
14	Ramming Test No. 14

Five (5) data tapes and one (1) video tape recorded during this Dedicated Trial.


0
5
10
SCALE
(NAUTICAL MILES)
CAPE CRAUFORD
FROM AMSTERDAM
OPEN WATER
RAMMING TESTS SERIES A
00.00/7th
ICE EDGE JULY 6
RAMMING TESTS SERIES B
00.00/8th
ADMIRALTY INLET
ELWIN INLET
RAMMING TESTS SERIES C
00.00/9th
BAILLAPGE BAY
10/10 ICE
ICE EDGE JULY 9
STRATHCONA SOUND
ARCTIC BAY
NANISIVIK

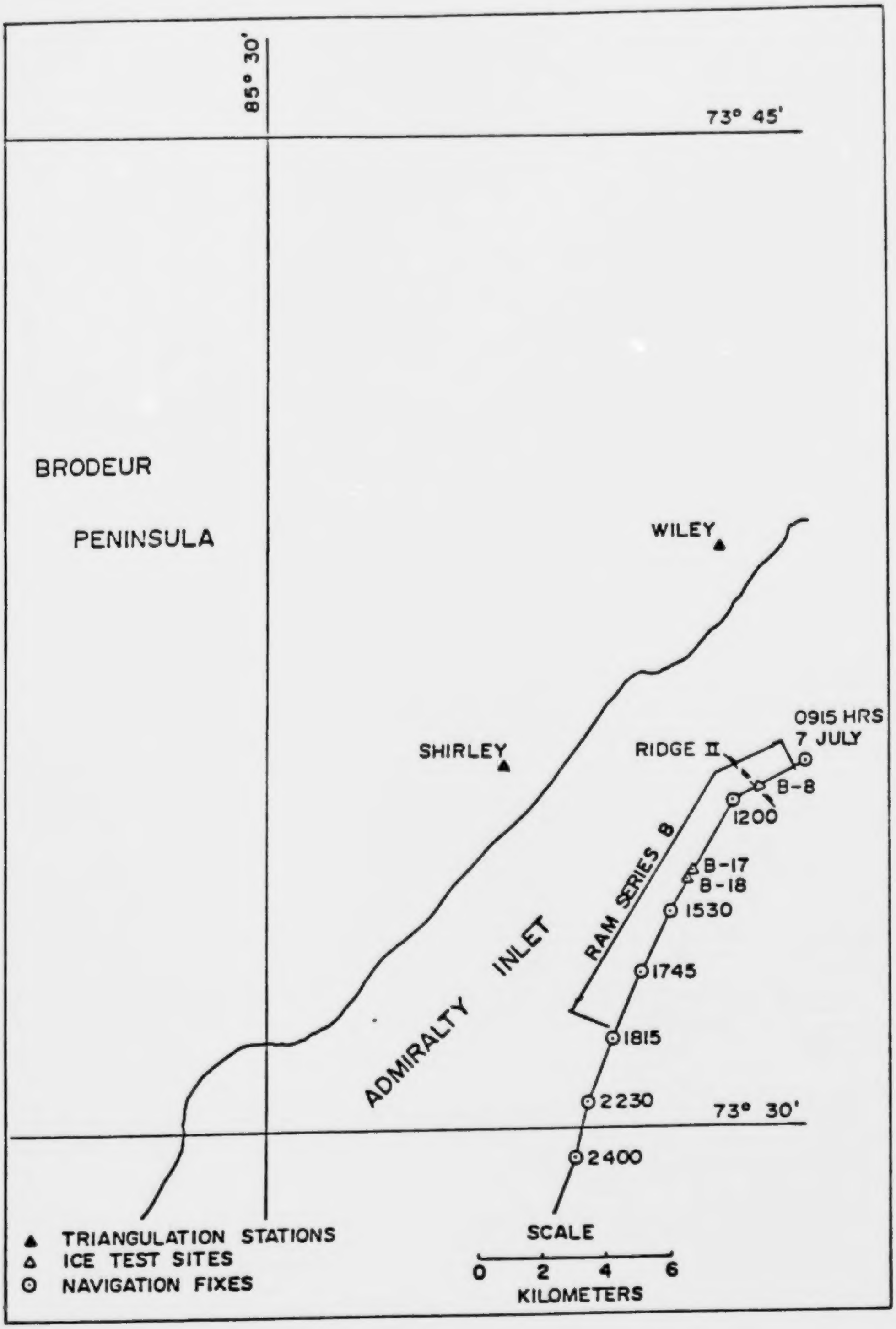
TRACK THROUGH ADMIRALTY INLET

Figure 3.17


85° 00'
84° 30
73° 45'
73° 30'
CAPE CRAUFORD
BRODEUR PENINSULA
LANCASTER SOUND
JULY 6 ICE FRONT
6/1
0800 HRS. 6 JULY
6/2
0900-2200 HRS. 6 JULY
ACCELERATION TESTS
5/1
RAM SERIES A
RIDGE I
0500 HRS. 7 JULY
0800 HRS 7 JULY
ADMIRALTY INLET
LARGE PRESSURE RIDGE
FLAT 1st YEAR WITH RIDGING
5/3
5/2
SMALL BERG
RAFTED ICE
SCALE
0
2
4
6
KILOMETERS
▲ TRIANGULATION STATION
△ ICE TEST SITES
⊙ SHIP NAVIGATION FIXES

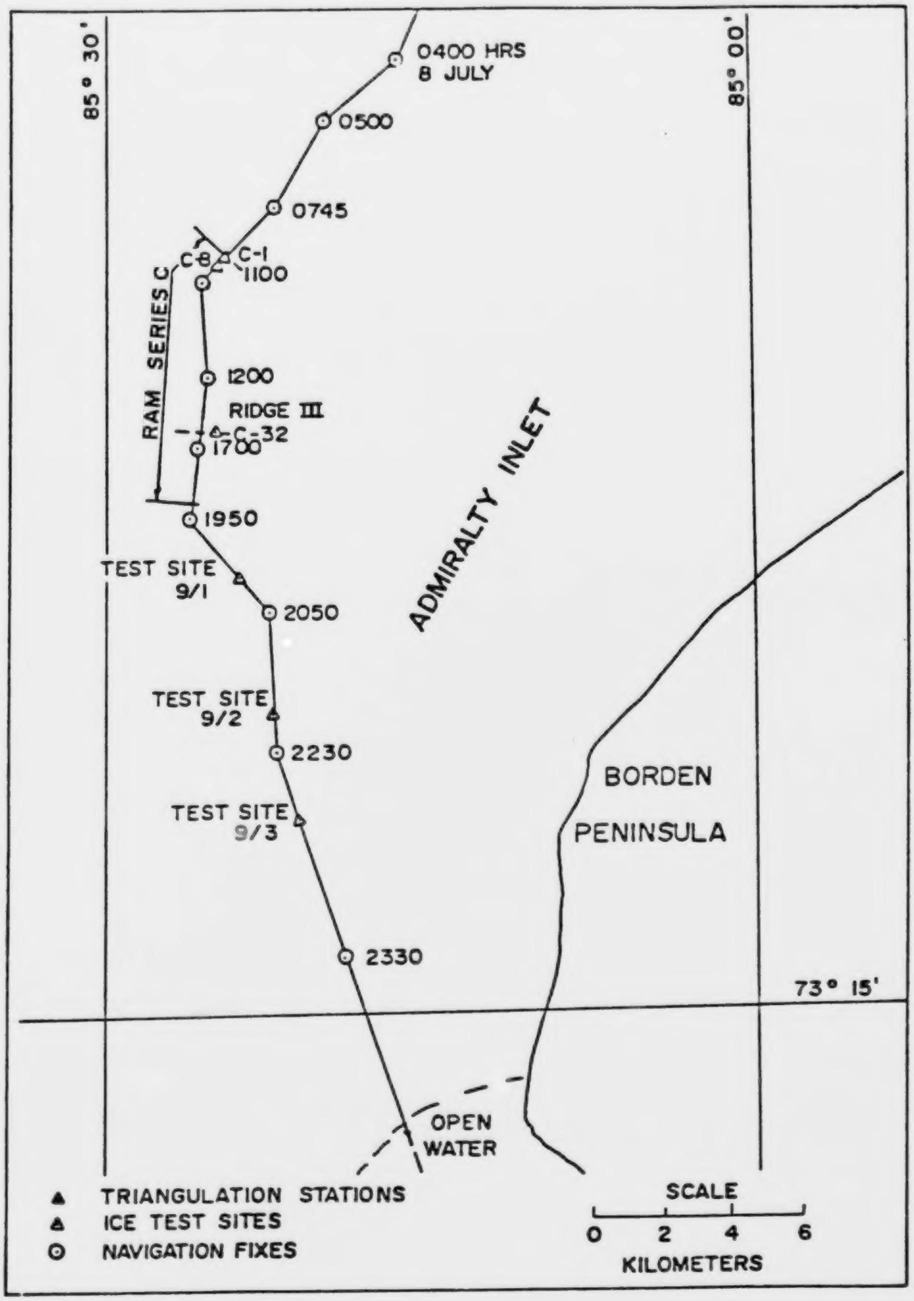
LOCATION OF THE VARIOUS TEST SITES

Figure 3.18


85° 30'
73° 45'
BRODEUR
PENINSULA
WILEY
SHIRLEY
ADMIRALTY INLET
RAM SERIES B
RIDGE II
0915 HRS
7 JULY
B-8
1200
B-17
B-18
1530
1745
1815
2230
2400
73° 30'
▲ TRIANGULATION STATIONS
△ ICE TEST SITES
⊙ NAVIGATION FIXES
SCALE
0
2
4
6
KILOMETERS

LOCATION OF THE VARIOUS TEST SITES

Figure 3.19


85° 30'
85° 00'
0400 HRS
8 JULY
0500
0745
C-8
C-1
1100
RAM SERIES C
1200
RIDGE III
C-32
1700
1950
TEST SITE
9/1
2050
TEST SITE
9/2
2230
TEST SITE
9/3
2330
ADMIRALTY INLET
BORDEN
PENINSULA
73° 15'
OPEN
WATER
▲ TRIANGULATION STATIONS
△ ICE TEST SITES
⊙ NAVIGATION FIXES
SCALE
0
2
4
6
KILOMETERS

LOCATION OF THE VARIOUS TEST SITES

Figure 3.20

SAMPLING PATTERNS

Admiralty Inlet Trials

1981 Season

Channel Number	Gen.	Gen. & A	A2 &B	Gen. & B	A6
1	2P	2P	2P	2P	2P
2	2P	2P	2P	2P	2P
3					
4					
5					
6					
7					
8					
9					
10					
11			4P	4P	
12			4P	4P	
13			4P	4P	
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					

SAMPLING PATTERNS

Admiralty Inlet Trials

1981 Season

Channel Number	Gen.	Gen. & A	A2 &B	Gen. & B	A6
31	2P	2P	2P	2P	2P
32					
33	2P	2P	2P	2P	2P
34	2P	2P	2P	2P	2P
35					
36	2P	2P	2P	2P	2P
37					
38	2P	2P	2P	2P	2P
39	2P	2P	2P	2P	2P
40	2P	2P	2P	2P	2P
41	2P	2P	2P	2P	2P
42	2P	2P	2P	2P	2P
43	2P	2P	2P	2P	2P
44	2P	2P	2P	2P	2P
45	2P	2P	2P	2P	2P
46	2P	2P	2P	2P	2P
47					
48					
49					
50	2P	2P	2P	2P	2P
51	2P	2P	2P	2P	2P
52					
53	2P	2P	2P	2P	2P
54	2P	2P	2P	2P	2P
55	2P	2P	2P	2P	2P
56	2P	2P	2P	2P	2P
57	2P	2P	2P	2P	2P
58					
59	2P	2P	2P	2P	2P
60					

SAMPLING PATTERNS

Admiralty Inlet Trials

1981 Season

Channel Number	Gen.	Gen. & A	A2 &B	Gen. & B	A6
61					
62					
63	2P	2P	2P	2P	2P
64					
65					
66	2P	2P	2P	2P	2P
67	2P	2P	2P	2P	2P
68					
69	2P	2P	2P	2P	2P
70	2P	2P	2P	2P	2P
71	2P	2P	2P	2P	2P
72	2P	2P	2P	2P	2P
73	2P	2P	2P	2P	2P
74	2P	2P	2P	2P	2P
75	2P	2P	2P	2P	2P
76					
77					
78					
79					
80					
81	2P	2P	2P	2P	2P
82			5R		
83					
84	2P	2P	2P	2P	2P
85	2P	2P	2P	2P	2P
86					
87					
88	2P	2P	2P	2P	2P
89	2P	2P	2P	2P	2P
90	2P	2P	2P	2P	2P

SAMPLING PATTERNS

Admiralty Inlet Trials

1981 Season

Channel Number	Gen.	Gen. & A	A2 &B	Gen. & B	A6
91	2P	2P	2P	2P	2P
92					
93	2P	2P	2P	2P	2P
94	2P	2P	2P	2P	2P
95	2P	2P	2P	2P	2P
96					
97	2P	2P	2P	2P	2P
98	2P	2P	2P	2P	2P
99	2P	2P	2P	2P	2P
100	2P	2P	2P	2P	2P
101	2P	2P	2P	2P	2P
102	2P	2P	2P	2P	2P
103	2P	2P	2P	2P	2P
104	2P	2P	2P	2P	2P
105	2P	2P	2P	2P	2P
106	2P	2P	2P	2P	2P
107					
108					
109					
110	2P	2P	2P	2P	2P
111	2P	2P	2P	2P	2P
112	2P	2P	2P	2P	2P
113	2P	2P	2P	2P	2P
114	2P	2P	2P	2P	2P
115	2P	2P	2P	2P	2P
116	2P	2P	2P	2P	2P
117	2P	2P	2P	2P	2P
118	2P	2P	2P	2P	2P
119					
120	2P	2P	2P	2P	2P

SAMPLING PATTERNS
Admiralty Inlet Trials
1981 Season

Channel Number	Gen.	Gen. & A	A2 &B	Gen. & B	A6
121	2P	2P	2P	2P	2P
122	2P	2P	2P	2P	2P
123					
124					
125					
126	2P	2P	2P	2P	2P
127	2P	2P	2P	2P	2P
128					
129	2P	2P	2P	2P	2P
130	2P	2P	2P	2P	2P
131	2P	2P	2P	2P	2P
132	2P	2P	2P	2P	2P
133	2P	2P	2P	2P	2P
134	2P	2P	2P	2P	2P
135	2P	2P	2P	2P	2P
136	2P	2P	2P	2P	2P
137	2P	2P	2P	2P	2P
138	2P	2P	2P	2P	2P
139	2P	2P	2P	2P	2P
140					
141	2P	2P	2P	2P	2P
142	2P	2P	2P	2P	2P
143					
144	2P	2P	2P	2P	2P
145	2P	2P	2P	2P	2P
146	2P	2P	2P	2P	2P
147	2P	2P	2P	2P	2P
148	2P	2P	2P	2P	2P
149	2P	2P	2P	2P	2P
150					

SAMPLING PATTERNS
Admiralty Inlet Trials
1981 Season

Channel Number	Gen.	Gen. & A	A2 &B	Gen. & B	A6
151	2P	2P	2P	2P	2P
152	2P	2P	2P	2P	2P
153	2P	2P	2P	2P	2P
154	2P	2P	2P	2P	2P
155	2P	2P	2P	2P	2P
156	2P	2P	2P	2P	2P
157	2P	2P	2P	2P	2P
158	2P	2P	2P	2P	2P
159	2P	2P	2P	2P	2P
160	2P	2P	2P	2P	2P
161	2P	2P	2P	2P	2P
162	2P	2P	2P	2P	2P
163	2P	2P	2P	2P	2P
164		5R	5R		6P
165		5R	5R	5R	
166	2P	2P		2P	2P
167	2P	2P		2P	2P
168			5R	5R	
169	2P	2P	2P	2P	2P
170	2P	2P	2P	2P	2P
171		5R			
172		5R			
173		5R	5R		
174		5R	5R		
175					
176			3R	3R	
177			3R	3R	
178			3R	3R	
179			3R	3R	
196	2R	2R	2R	2R	2R

SAMPLING PATTERNS

Admiralty Inlet Trials

1981 Season

Channel Number	Gen.	Gen. & A	A2 &B	Gen. & B	A6
198	3R	3R	3R	3R	3R
199	3R	3R	3R	3R	3R
200	2R	2R	2R	2R	2R
201	3R	3R	3R	3R	3R
208	3R	3R	3R	3R	3R
211	2R	2R	2R	2R	2R
212	2P	2P	2P	2P	2P
213	2P	2P	2P	2P	2P
214	2P	2P	2P	2P	2P
215			4P	4P	
216			4P	4P	
217			4P	4P	
233	2R	2R	2R	2R	2R
234	2R	2R	2R	2R	2R
236	2R	2R	2R	2R	2R
237	2R	2R	2R	2R	2R
238	2R	2R	2R	2R	2R
239	3R	3R	3R	3R	3R
240	3R	3R	3R	3R	3R
255	2P	2P	2P	2P	2P

DEDICATED TRIALS

DATE 7th July 1981

TEST Ramming Test No. 1

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TR 3632

LOCATION Admiralty Inlet

LAT: 73 • 35 'N
LONG: 84 • 45 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. M.
AFT. M.
CARGO ☐
BALLAST ☒
BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*				
ICE COVER (1Y, 2Y, MY, TOT)	TENTHS			10	10	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa		*			
RIDGES						
CRYSTAL						
SALINITY	%	*				
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING ☐
IN ATTENDANCE ☐

OBJECTIVE To determine structural response to ramming at a speed of 4 knots

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐
INTERVAL • SEC
HEADER ☐
EOF ☐
OMIT CHANNELS:

VIDEO RECORDING TIME 02:28:00 TO 02:57:38 GMT

PHOTOS • # TO

TESTS Tape No.	TIME ON TAPE START	STOP	Contractor Tape No.	Test Nos.	Sampling Pattern
81-T2-2.1	02:28:00	02:57:38	D2	A1-4	General

COMMENTS

Impact Speed = 4 knots
Even trim

DEDICATED TRIALS

DATE 7th July 1981

TEST Ramming Test No. 2

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TR 3632

LOCATION Admiralty Inlet

LAT: 73 ° 35 'N
LONG: 84 ° 45 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. M.
AFT. M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*				
ICE COVER 1Y 2Y MY TOT	TENTHS			10	10	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa		*			
RIDGES						
CRYSTAL						
SALINITY	%	*				
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING ☐

IN ATTENDANCE ☐

OBJECTIVE To determine structural response to ramming at a speed of 5 knots

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐

INTERVAL • SEC

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME 03:04:38 TO 04:02:40 GMT

PHOTOS • # TO

TESTS

Tape No.	TIME ON TAPE START	STOP	Contractor Tape No.	Test Nos.	Sampling Pattern
81-T2-2.1	03:04:38	04:02:40	D2	A5-10	General

COMMENTS Impact speed = 5 knots
Even trim

DEDICATED TRIALS

DATE 7th July 1981

TEST Ramming Test No. 3

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TR 3632

LOCATION Admiralty Inlet

LAT: 73 ° 35 'N
LONG: 84 ° 45 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. M. CARGO ☐ BUBBLER ON ☒
AFT. M. BALLAST ☒ OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*				
ICE COVER 1Y 2Y MY TOT	TENTHS			10	10	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa		*			
RIDGES						
CRYSTAL						
SALINITY	‰	*				
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN.						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING ☐
IN ATTENDANCE ☐

OBJECTIVE To determine structural response to ramming at a speed of 5 knots

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE RECORDING ☒ STANDBY ☐
INTERVAL * SEC
HEADER ☐
EOF ☐
OMIT CHANNELS:

VIDEO RECORDING TIME 04:07:30 TO 04:46:20 GMT

PHOTOS * # TO

TESTS Tape No.	TIME ON TAPE START	TIME ON TAPE STOP	Contractor Tape No.	Test Nos.	Sampling Pattern
81-T2-2.1	04:07:30	04:46:20	D2	A13-18	General

COMMENTS Impact speed = 5 knots
Even trim

DEDICATED TRIALS

DATE 7th July 1981

TEST Ramming Test No. 4

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TR 3632

LOCATION Admiralty Inlet

LAT: 73 • 20 'N
LONG: 85 • 30 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. M.
AFT. M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☒
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM					
ICE COVER (1Y / 2Y / MY / TOT)	TENTHS			10	10	Level ice
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%	*				
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING ☐
IN ATTENDANCE ☐

OBJECTIVE To determine structural response to ramming at a speed of 6 knots

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐

INTERVAL • SEC

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME 14:04:03 TO 15:04:00 GMT

PHOTOS • # TO

TESTS

Tape No.	TIME ON TAPE START	TIME ON TAPE STOP	Contractor Tape No.	Test Nos.	Sampling Pattern
81-T2-3.1	14:04:03	15:04:00	D3	B1-7	General

COMMENTS

Impact speed = 6 knots
Even trim

DEDICATED TRIALS

DATE 7th July 1981

TEST Ramming Test No. 5

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TR 3632

LOCATION Admiralty Inlet

LAT: 73 ° 20 'N
LONG: 85 ° 30 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. M.
AFT. M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☒
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		167		
ICE COVER 1Y 2Y MY TOT	TENTHS			10	10	
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa		*		6.7	
FRICTION						
PRESSURE	MPa					Ridge data:
RIDGES		*				Freeboard F_b = 0.21 m
CRYSTAL						F_b max = 0.25 m
SALINITY	%					Level ice h_i = 3.00 m
% BARE ICE	%					h_i max = 4.9 m
AIR TEMP	DEG C					Ridge width = 1.55 m
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING ☐
IN ATTENDANCE ☐

OBJECTIVE To determine structural response to ramming at a speed of 6 knots.

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐

INTERVAL • SEC

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME 15:08:50 TO 15:50:46 GMT

PHOTOS • # TO

TESTS Tape No.	TIME ON TAPE START	STOP	Contractor Tape No.	Contractor Test No.	Sampling Pattern
81-T2-3.1	15:08:50	15:41:23	D3	B8-12	General
81-T2-3.2	15:47:45	15:50:46	D3	B13	General

COMMENTS Impact speed = 6 knots
Even trim

DEDICATED TRIALS

DATE 7th July 1981	**TEST** Ramming Test No. 6

CONTRACTOR Fenco Consultants Ltd. **FINAL REPORT NO.** TP 3632

LOCATION Admiralty Inlet **LAT:** 73 • 20 'N **LONG:** 85 • 30 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. M. **CARGO** ☐ **BUBBLER ON** ☒
AFT. M. **BALLAST** ☒ **OFF** ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		162	170	
ICE COVER (IY / 2Y / MY / TOT)	TENTHS			10	10	Level Ice
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa		*	151	176	Ice temp. = -0.4 deg. C
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%	*		2.15	2.50	
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING ☐
IN ATTENDANCE ☐

OBJECTIVE To determine structural response to ramming at a speed of 6 knots

REASON FOR SAMPLING PATTERN

RECORDING NOTES
MODE **RECORDING** ☒ **STANDBY** ☐ **INTERVAL** • **SEC** **HEADER** ☐ **EOF** ☐
OMIT CHANNELS:

VIDEO RECORDING TIME 17:55:45 **TO** 19:38:00 **GMT**

PHOTOS • # **TO**

TESTS Tape No.	TIME ON TAPE START	STOP	Contractor Tape No.	Test No.	Sampling Pattern
81-T2-4.1	17:55:45	17:57:22	D4	B15	General + A
81-T2-4.2	18:04:25	18:35:30	D4	B16-19	General + A
81-T2-4.3	18:39:40	18:51:10	D4	B20-21	General + A
81-T2-4.4	18:58:40	19:30:00	D4	B22-25	General + A

COMMENTS

Impact speed = 6 knots
Even trim

DEDICATED TRIALS

DATE 7th July 1981

TEST Ramming Test No. 7

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TR 3632

LOCATION Admiralty Inlet

LAT: 73 • 20 'N
LONG: 85 • 30 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. M.
AFT. M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☒
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM					
ICE COVER IY 2Y MY TOT	TENTHS			10	10	Level Ice
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰	*				
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING ☐

IN ATTENDANCE ☐

OBJECTIVE To determine structural response to ramming at a speed of 6 knots

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐

INTERVAL • SEC

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME TO GMT

PHOTOS • # TO

TESTS Tape No.	TIME ON TAPE START	STOP	Contractor Test No.
No tape recording			B27-34

COMMENTS

Impact speed = 6 knots
Trim down at bow

DEDICATED TRIALS

DATE 8th July 1981

TEST Ramming Test No. 8

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TP 3632

LOCATION Admiralty Inlet

LAT: 73 • 25 'N
LONG: 85 • 25 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. M.
AFT. M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		170		
ICE COVER 1Y 2Y MY TOT	TENTHS			10	10	Level ice
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa		*		6.3	
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%	*				
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING ☐
IN ATTENDANCE ☐

OBJECTIVE To determine structural response to ramming at a speed of 6 knots.

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐

INTERVAL • SEC

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME 13:39:16 TO 14:22:41 GMT

PHOTOS • # TO

TESTS Tape No.	TIME ON TAPE START	STOP	Contractor Tape No.	Test No.	Sampling Pattern
81-T2-5.1	14:12:38	14:22:41	D5	C1-6	A2 + B

COMMENTS Impact speed = 6 knots
Trim up at bow

DEDICATED TRIALS

DATE 8th July 1981

TEST Ramming Test No. 9

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TR 3632

LOCATION Admiralty Inlet

LAT: 73 ° 25 'N
LONG: 85 ° 25 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. M.
AFT. M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☒
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		180		
ICE COVER 1Y 2Y MY TOT	TENTHS			10	10	Level Ice
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa		*		6.7	
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰	*				
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING ☐
IN ATTENDANCE ☐

OBJECTIVE To determine structural response to ramming at a speed of 6 knots.

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐

INTERVAL = SEC

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME
14:26:30 TO 15:12:30 GMT

PHOTOS =
TO

TESTS Tape No.	TIME ON TAPE START	STOP	Contractor Tape No.	Test No.	Sampling Pattern
81-T2-5.1	14:26:30	14:56:53	D5	C7-12	A2 + B

COMMENTS

Impact speed = 6 knots
Trim up at bow

DEDICATED TRIALS

DATE 8th July 1981

TEST Ramming Test No. 10

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TR 3632

LOCATION Admiralty Inlet

LAT: 73 • 25 'N

LONG: 85 • 25 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. M.

AFT. M.

CARGO ☐

BALLAST ☒

BUBBLER ON ☒

OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM					
ICE COVER IY 2Y MY TOT	TENTHS			10	10	Level ice
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%	*				
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

CHANNEL / MODE	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING ☐

IN ATTENDANCE ☐

OBJECTIVE To determine structural response to ramming at a speed of 2 knots.

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE RECORDING ☒

STANDBY ☐

INTERVAL * SEC

HEADER ☐

EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME 15:26:38 TO 15:56:54 GMT

PHOTOS * TO

TESTS Tape No.	TIME ON TAPE START	STOP	Contractor Tape No.	Contractor Test No.	Sampling Pattern
81-T2-5.2	15:27:25	15:27:25	D5	C13	A2 + B
81-T2-5.3	15:35:50	15:37:10	D5	C14	A2 + B
81-T2-5.5	15:43:48		D5	C15	A2 + B
81-T2-5.7	15:54:50		D5	C16	A2 + B

COMMENTS

Impact speed = 2 knots
Trim up at bow

DEDICATED TRIALS

DATE 8th July 1981

TEST Ramming Test No. 11

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TP 3632

LOCATION Admiralty Inlet

LAT: 73 • 25 'N
LONG: 85 • 25 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. M.
AFT. M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☐
OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM					
ICE COVER (1Y, 2Y, MY, TOT)	TENTHS			10	10	Level ice
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa					
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%	*				
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

CHANNEL / MODE	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING ☐
IN ATTENDANCE ☐

OBJECTIVE To determine structural response to ramming at a speed of 2 knots

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐

INTERVAL • SEC

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME 15:59:55 TO 16:24:30 GMT

PHOTOS • # TO

TESTS Tape No.	TIME ON TAPE START	 STOP	Contractor Test No.
No tape recording			C17-22

COMMENTS Impact speed = 2 knots
Trim up at bow

DEDICATED TRIALS

DATE 8th July 1981

TEST Ramming Test No. 12

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TR 3632

LOCATION Admiralty Inlet

LAT: 73 ° 25 ' N
LONG: 85 ° 25 ' W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. M. CARGO ☐ BUBBLER ON ☐
AFT. M. BALLAST ☒ OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		180		
ICE COVER 1Y 2Y MY TOT	TENTHS			10	10	Level ice
SNOW COVER	CM.					Ice temp = -0.45 deg. C
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa		*		6.5	
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%	*		3.53		
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING ☐
IN ATTENDANCE ☐

OBJECTIVE To determine structural response to ramming at a speed of 3 knots.

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE RECORDING ☒ HEADER ☐
STANDBY ☐ INTERVAL • SEC EOF ☐
OMIT CHANNELS:

VIDEO RECORDING TIME 19:06:15 TO 19:36:46 GMT

PHOTOS • # TO

TESTS Tape No.	TIME ON TAPE START	STOP	Contractor Tape No.	Contractor Test No.	Sampling Pattern
81-T2-6.1	19:07:30		D6	C23-24	General + B
81-T2-6.3	19:17:55		D6	C25	General + B
81-T2-6.4	19:24:38		D6	C26	General + B
81-T2-6.5	19:28:28		D6	C27	General + B

COMMENTS

Impact speed = 3 knots
Trim up at bow

DEDICATED TRIALS

DATE 8th July 1981

TEST Ramming Test No. 13

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TP 3632

LOCATION Admiralty Inlet

LAT: 73 ° 25 'N
LONG: 85 ° 25 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. M.	CARGO ☐	BUBBLER	ON ☐
AFT. M.	BALLAST ☒		OFF ☒

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		115		
ICE COVER 1Y 2Y MY TOT	TENTHS			10	10	Level ice Freeboard = 50 cm
SNOW COVER	CM.					
FLEXURAL STRENGTH	KPa		*	104		
COMPRESSIVE STRENGTH	MPa		*	6.0	6.5	
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	‰	*				
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

CHANNEL / MODE	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:
FOLLOWING ☐
IN ATTENDANCE ☐

OBJECTIVE To determine structural response to ramming at a speed of 4 knots

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE RECORDING ☒ STANDBY ☐

INTERVAL * SEC

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME 19:44:20 TO 20:38:18 GMT

PHOTOS * # TO

TESTS Tape No.	TIME ON TAPE START	STOP	Contractor Tape No.	Contractor Test No.	Sampling Pattern
81-T2-6.9	19:44:20		D6	C29	General + B
81-T2-6.10	19:50:54		D6	C30-32	General + B
81-T2-6.11	20:16:30		D6	C33	General + B
81-T2-6.12	20:25:11		D6	C34	General + B
81-T2-6.13	20:35:26		D6	C35	A6
81-T2-6.14	20:36:35		D6	C35	A6

COMMENTS Impact speed = 4 knots
Trim up at bow

DEDICATED TRIALS

DATE 8th July 1981

TEST Ramming Test No. 14

CONTRACTOR Fenco Consultants Ltd.

FINAL REPORT NO. TP 3632

LOCATION Admiralty Inlet

LAT: 73 ° 25 'N
LONG: 85 ° 25 'W

OPERATING CONDITIONS (SHIP)

DRAUGHT FWD. M.
AFT. M.

CARGO ☐
BALLAST ☒

BUBBLER ON ☒
OFF ☐

ENVIRONMENTAL CONDITIONS

PARAMETER	UNITS	MEAS	EST	RANGE		COMMENTS
ICE THICKNESS	CM	*		138		
ICE COVER 1Y 2Y MY TOT	TENTHS			10	10	Level ice
SNOW COVER	CM.					Freeboard = 0.25 m
FLEXURAL STRENGTH	KPa					
COMPRESSIVE STRENGTH	MPa		*	6.0	6.5	
FRICTION						
PRESSURE	MPa					
RIDGES						
CRYSTAL						
SALINITY	%	*				
% BARE ICE	%					
AIR TEMP	DEG C					
WIND SPEED	KNOTS					
WIND DIRN						
ATMOSPHERIC PRESSURE	KPa					
CLOUD COVER	TENTHS					

TRANSIT MODE

MODE \ CHANNEL	BROKEN	OLD	NEW	OPEN WATER
CONTINUOUS				
RAMMING			*	
ASTERN				
TURNING				

ICEBREAKER SUPPORT

NAME:

FOLLOWING ☐

IN ATTENDANCE ☐

OBJECTIVE To determine structural response to ramming at a speed of 4 knots.

REASON FOR SAMPLING PATTERN

RECORDING NOTES

MODE RECORDING ☒
STANDBY ☐

INTERVAL * SEC

HEADER ☐
EOF ☐

OMIT CHANNELS:

VIDEO RECORDING TIME 23:24:35 TO 23:38:50 GMT

PHOTOS *
TO

TESTS Tape No.	TIME ON TAPE START	STOP	Contractor Tape No.	Test No.	Sampling Pattern
81-T2-7.9	23:25:53	23:38:50	D7	C37-38	General + B + A6

COMMENTS Impact speed = 4 knots
Trim up at bow

APPENDIX 'A'

Sensor Status

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1.0 GENERAL

This appendix provides summary charts of the sensors which have been recorded on each of the data tapes during the 1979, 1980 and 1981 seasons. In addition, the calibration and/or verification status of each is indicated in relation to the recording dates for each of the tapes.

1.1 SENSOR ALLOCATION

Table I is a listing of the sensor allocations which make up the Data Acquisition System. This listing details the types of sensors used, the measured and derived parameters, the ranges which they cover in SI units, and an identifying code.

1.2 RECORDED DATA AND SENSOR STATUS

Charts 1 - 4 provided at the end of this section give information as to the channel numbers recorded on each tape during each of the three (3) recording seasons. The tapes are categorized by a voyage number and a tape number which are in turn cross-referenced to the individual voyage records.

These charts provide the following information:

1. The first column is the category code and identifies the type of sensor. This code must be used in conjunction with Table I where transducer particulars are included.

2. The second column is the channel number. Where channel numbers are missing from the sequence, sensors have not been allocated.

3. Column three is the conversion equation applicable to the individual sensors to convert the tape data to SI units. These equations are used in both the playback and acquisition programs.

4. The following columns show the voyage numbers, the dates between which the voyages took place and the tape index numbers recorded

1.2 RECORDED DATA AND SENSOR STATUS (Cont'd)

during each voyage. This data is cross-referenced, by tape index, to the individual voyage records.

A horizontal line under the tape index number indicates that the sensor to which it is associated was included in the sampling pattern for that tape.

5. During the 1980 and 1981 season, some channels were converted to provide for filters instead of sensor amplifiers. The operator then, optionally, routed sensor outputs through these filters. The channels used are identified by code on the status charts, and the number of the channel output which was filtered is superimposed at the tape index where it became effective.

6. Interspersed with these voyage dates are the dates when sensor outputs were verified, replaced and/or recalibrated. An "x" indicates that such action confirmed the sensor was operational at that time. When recalibration or replacement necessitated a modification to the conversion equation, the new equation is indicated on the charts at the applicable date.

   It should be noted that in two cases, more than one (1) channel provides data for a single print-out. Channels 228, 229 and 230 gather data on the Barometric Pressure settings, with the final calculated value printed out under channel number 230.

   Channel 237 and 238 record the sine and cosine of the ships heading angle, with the true ships heading printed out under channel number 238.

1.3 VERIFICATION AND CALIBRATION

Verification dates have been provided to assist in assessing the validity

1.0 GENERAL (Cont'd)

1.3 VERIFICATION AND CALIBRATION (Cont'd)

of the recorded data. However, a lack of verification does not necessarily invalidate all of the data recorded from a specific sensor, but further analysis may be worthwhile to confirm its status.

Where verification is indicated the procedure was generally as follows:

The DC resistance of strain gauges and the leakage to ground were confirmed as being within acceptable limits.

The strain gauge bridge was re-balanced if outside a range of 0.1 - 0.3 volts at the desired amplifier output.

Calibration of channels other than strain gauges was verified and the amplifier output adjusted as necessary, and/or the conversion equation modified to reflect the new values.

It should be noted that the charts reflect some editing to remove channels which the statistical print-outs indicate were obviously malfunctioning or which could not be verified but had been included in the sampling pattern. For reference, these channels are listed on the individual voyage records.

2.0 NOTES ON 1979 SEASON

2.1 1979 SEASON - STRAIN GAUGE DATA

During the 1979 season, and including the period of the Saguenay River trials in 1980, the strain gauge amplifier cards had a range of ±1000 micro-strains. This has resulted in all print-outs of the strain gauge data collected during this period showing about twice the actual strain values. Further, gauge factors for the strain gauges were not included in computation of the printed values. Tapes affected are numbers 1 to 39 and T1 - T9.

2.0 NOTES ON 1979 SEASON (Cont'd)

2.1 1979 SEASON - STRAIN GAUGE DATA (Cont'd)

The conversion equations provided on chart number 1 have been modified to correct this and can be used directly with the raw data on the tape.

The gain of all amplifier cards was modified to cover a ±2000 microstrain range for the 1980 and 1981 seasons, hence the changes in the conversion equations.

2.2 SAGUENAY RIVER TRIALS DATA

Following the Saguenay River Trials it was noted that box 5 of the Data Acquisition System had not been powered up throughout the trial. This box processes the inputs from the midship strain gauges and the bubbler pressure transducers.

A series of tests was conducted which made it evident that the data outputs had been affected by this omission, but that calibration of the effect on the data was possible.

An overall effect was noted on each of the channel outputs and this is shown in Figure 8, and in Table 2.

An additional effect was noted which was peculiar to each bin and the correction factors applicable are shown in Table 3.

For analyzing tapes T1 - T9 (see report TP2627 Volume II) a program was developed to apply the proper correction factors to each channel during playback. This program, designated PBVAL, is appended to the above referenced report.

SENSOR ALLOCATION

Page 1

	Measured Parameter	Derived Parameter	Type of Sensor	Range	Number of Channels
1.	**HULL STRUCTURE**				
A	Structural Strains Starboard Bow	Ice loads Impact Counts Pressure	Strain Gauge Ailtech Type SG 129	±2000 * micro-strains	139
B	Structural Strains Port Bow	Ice Loads Impact Counts Pressure	Strain Gauge Ailtech Type SG 129	±2000 * micro-strains	20
C	Structural Strains Field Ice Pressure	Ice Loads Impact Counts Field Ice Pressure	Strain Gauge Ailtech Type SG 129	±2000 * micro-strains	10
D	Structural Strains Starboard Shoulder	Ice Loads Impact Counts	Strain Gauge Ailtech Type SG 129	±2000 micro-strains	25
E	Structural Strains Mid-ship Deck Beams		Strain Gauge Ailtech Type SG 129	±2000 micro-strains	4
F	Hull Temperature Above Water Line	Temperature Gradient	Thermistors Fenwal Electric Type GB 32P2	-20 to +50 deg. C	2
G	Hull Temperature Below Water Line	Temperature Gradient	Thermistors Fenwal Electric Type GB 32P2	-20 to +50 deg. C	2
H	Filtered Strain Gauge Output				
2.	**PROPULSION SYSTEM**				
A	Shaft Thrust	Total Thrust	Renk Thrust Meter Type - RCIK-3	±1171 kN	1
B	Fuel Rack Position	Fuel Consumption Power	Follow-up Potentiometer	0-70 mm	1
C	Propeller Pitch Response	Pitch Change Resistance	Follow-up Potentiometer	-16 - Astern +22 - Ahead	1

* for 1979 Season range is ±1000 micro-strains

TABLE 1

SENSOR ALLOCATION (Cont'd)

Page 2

	Measured Parameter	Derived Parameter	Type of Sensor	Range	Number of Channels
2.	**PROPULSION SYSTEM (Cont'd)**				
D	Propeller Pitch OD Box-Differential Pressure	Propeller Spindle Torque	Pressure Transducer SELABS Type SE 21/v	0 - 14 MPa	1
E	Shaft Torque	Shaft Horsepower	S3G Bridge & Telemetry Torque Meter	0 - 800 kNm	1
F	Engine RPM	Brake Horsepower	Ship Engine Instrumentation	0 - 600 RPM	
G	Shaft RPM	Shaft Horsepower	Ships Shaft Tachometer	0 - 200 RPM	1
H	Propeller Pitch		Follow-up Potentiometer	+10 - Ahead -10 - Astern	1
3.	**AUXILIARY SYSTEM**				
A	Air Pressure Bubbler Compressor Starboard	Air Volume Flow	Pressure Transducer Entran EPS-1032-50	0-345 kPa	1
B	Air Pressure Bubbler Compressor Port	Air volume Flow	Pressure Transducer Entran EPS-1032-50	0-345 kPa	1
C	Bubbler Valve	Bubbler Mode	Decoding Relays - From Modem of Valve Status	ON - OFF	3
4.	**SHIP PERFORMANCE**				
A	Accelerations Heave, Surge Sway - Fwd.	Ship Motions Ice Forces	Accelerometers Entran Devices Inc. EGC-240-107	±24.5 m/s/s	3
B	Accelerations Heave, Surge Sway - Aft.	Ship Motions Ice Forces	Accelerometers Entran Devices Inc. EGC-240-107	±24.5 m/s/s	3

TABLE 1

SENSOR ALLOCATION (Cont'd)

	Measured Parameter	Derived Parameter	Type of Sensor	Range	Number of Channels
4.	**SHIP PERFORMANCE (Cont'd)**				
C	Rudder Angle	Rudder Change Resistance	Follow-up Potentiometer	+37.5 Port -37.5 Stbd.	1
D	Steering Gear Differential Pressure	Rudder Stock Torque	Pressure Transducer SELABS Type SE 21/V	0-35 MPa	1
E	Ships Speed	Resistance	Doppler Log-Sperry Type SRD-301 12 12 Bit Digital Number	0-50 Knots	1
F	Ships Head	Turning Rate	Gyro Compass Type 37 Sine & Cosine of Heading	0-360 Degrees	2
G	Pitch	Ship Motions	Vertical Gyro-Humphry Inc. Model VM02-0127-1 Pitch Axis	0-40 Degrees Head & Stern	1
H	Roll	Ship Motions	Vertical Gyro-Humphry Inc. Model VM02-0127-1 Roll Axis	0-40 Degrees Port & Starboard	1
J	Draught (Fwd)	Displacement Wetted Surface	Manual Operation Decade Switch	7-12 m 0.5 m steps	1
K	Draught (Aft)	Displacement Wetted Surface	Manual Operation Decade Switch	7-12 m 0.5 m Steps	1
L	Rudder Command		Follow-up Potentiometer	+37.5 Port -37.5 Stbd.	1
M	Rudder Torque	Rudder Stock Torque	Full Strain Gauge Bridge		1
N	Filtered Accelerometer Output				

TABLE 1

SENSOR ALLOCATION (Cont'd)

	Measured Parameter	Derived Parameter	Type of Sensor	Range	Number of Channels
5.	ENVIRONMENTAL CONDITIONS				
A	Cloud Cover		Manually Operated Decade Switch	0-10 Tenths Cover	1
B	Ice Cover		Manually Operated Decade Switch	0-10 Tenths Cover	1
C	Barometric Pressure		Manually Operated Decade Switches	90-110 kPa	3
D	Air Temperature		Manually Operated Bourns Knobpot	0-100 degree C	1
E	Relative Humidity		Manually Operated Bourns Knobpot	0-100 %	1
F	Wind Speed	Wind force and moment	Anemometer Tachometer-Meteorological Instrumentation	0-100 Knots	1
G	Wind Direction	Wind force and moment	Wind Vane Synchro. Meteorological Instrumentation	0-360 Degrees relative to ship's head	1
H	Visibility		Manually Operated Decade Switch	0-10 Nautical Miles	1

TABLE 1

OBSERVED VOLTS "IN"	CORRECTED VOLTS "OUT"	CORRECTED COMPUTER "N" VALUE
- 5.8	- 9.0	51
- 4.8	- 7.0	154
- 3.8	- 5.0	256
- 2.4	- 3.0	358
- 0.8	- 1.0	461
+ 1.0	+ 1.0	563
+ 2.6	+ 3.0	666
+ 3.8	+ 7.0	870
+ 5.6	+ 9.0	973

Effect of loss of power to Box 5 on computer "n" number. See Figure 8.

TABLE 2

BOX NO.	BIN NO.	CORRECTION FACTOR
1	0	0.44
	1	0.97
2	2	0.82
	3	0.76
	4	0.82
3	5	0.69
	6	0.82
	7	0.85
4	8	1.0
	9	0.62
	10	0.91
5	11	0.00
6	12	0.828
	13	0.9
7	14	1.0
	15	0.849

Correction factors by bin number tapes 80-T1-1 to 80-T1-9
Saguenay River Trials

TABLE 3

SENSOR LISTING

Data Acquisition System

M.V. Arctic

1979 Season

Channel Number	PARAMETER MEASURED AND LOCATION
1	Accelerations -Heave -Forward
2	Accelerations -Sway -Forward
3	Strain - Starboard Frame 200.5
4	Strain - Starboard Frame 201.5
5	Hull Temperature
6	Hull Temperature
7	Hull Temperature
8	Hull Temperature
9	Hull Temperature
10	Hull Temperature
11	Strain Port Frame 179.0
12	Strain Port Frame 179.0
13	Strain Port Plate at Stringer 4A
14	Strain Port Frame 181.0
15	Strain Port Plate at Stringer 4
16	Strain Port Plate at Stringer 5
17	Strain Port Plate at Stringer 4A
18	Strain Port Frame 183.0
19	Strain Port Frame 185.0
20	Strain Port Plate at Stringer 5
21	Strain Port Frame 187.0
22	Strain Port Plate at Stringer 4A
23	Strain Port Frame 189.0
24	Strain Port Plate at Stringer 5
25	Strain Port Plate at Stringer 5
26	Strain Port Frame 191.0
27	Strain Port Plate at Stringer 4A
28	Strain Port Frame 194.5
29	Strain Port Frame 195.0

TABLE 4

SENSOR LISTING

Data Acquisition System

M.V. Arctic

1979 Season

Channel Number	PARAMETER MEASURED AND LOCATION
30	Strain Port Plate at Stringer 5
31	Accelerations - Surge - Forward
32	Strain Starboard Plate at Stringer 4A
33	Strain Starboard Plate at Stringer 5
34	Strain Starboard Frame 189.5
35	Strain Starboard Frame 190.5
36	Strain Starboard Frame 191.0
37	Strain Starboard Frame 191.0
38	Strain Starboard Frame 191.0
39	Strain Starboard Frame 191.0
40	Strain Starboard Frame 191.0
41	Strain Starboard Frame 191.0
42	Strain Starboard Frame 191.0
43	Strain Starboard Plate at Stringer 3
44	Strain Starboard Plate at Stringer 4
45	Strain Starboard Plate at Stringer 4A
46	Strain Starboard Plate at Stringer 5
47	Spare Channel
48	Strain - Starboard Frame 191.5
49	Strain Starboad Frame 192.5
50	Strain Starboard Frame 192.5
51	Strain Starboard Frame 193.0
52	Strain Starboard Frame 193.0
53	Strain Starboard Frame 193.0
54	Strain Starboard Plate at Stringer 4
55	Strain Starboard Plate at Stringer 4A
56	Strain Starboard Plate at Stringer 5
57	Strain Starboard Frame 193.5
58	Strain Starboard Frame 193.5

TABLE 4

SENSOR LISTING

Data Acquisition System

M.V. Arctic

1979 Season

Channel Number	PARAMETER MEASURED AND LOCATION
59	Strain Starboard Frame 194.5
60	Strain Starboard Frame 194.5
61	Spare Channel
62	Strain Starboard Frame 195.0
63	Strain Starboard Frame 195.0
64	Strain Starboard Frame 195.0
65	Strain Starboard Frame 195.0
66	Strain Starboard Plate at Stringer 4A
67	Strain Starboard Plate at Stringer 5
68	Strain Starboard Frame 195.5
69	Strain Starboard Frame 195.5
70	Strain Starboard Frame 196.5
71	Strain Starboard Frame 197.0
72	Strain Starboard Frame 197.0
73	Strain Starboard Frame 197.0
74	Strain Starboard Plate at Stringer 4A
75	Strain Starboard Plate at Stringer 5
76	Strain Starboard Frame 197.5
77	Strain Starboard Frame 198.5
78	Strain Starboard Frame 199.0
79	Strain Starboard Frame 199.5
80	Strain Starboard Plate at Stringer 4A
81	Strain Starboard Plate at Stringer 4A
82	Strain Starboard Plate at Stringer 4A
83	Strain Starboard Plate at Stringer 4A
84	Strain Starboard Plate at Stringer 5
85	Strain Starboard Frame 183.5
86	Strain Starboard Frame 184.5
87	Strain Starboard Frame 185.0

TABLE 4

SENSOR LISTING

Data Acquisition System

M.V. Arctic

1979 Season

Channel Number	PARAMETER MEASURED AND LOCATION
88	Strain Starboard Frame 185.0
89	Strain Starboard Frame 185.0
90	Strain Starboard Frame 185.0
91	Strain Starboard Frame 185.0
92	Strain Starboard Frame 185.0
93	Strain Starboard Plate at Stringer 3
94	Strain Starboard Plate at Stringer 4
95	Strain Starboard Plate at Stringer 4A
96	Strain Starboard Plate at Stringer 4A
97	Strain Starboard Plate at Stringer 4A
98	Strain Starboard Plate at Stringer 4A
99	Strain Starboard Plate at Stringer 5
100	Strain Starboard Frame 185.5
101	Strain Inner Skin at Stringer 5
102	Strain Inner Skin at Stringer 5
103	Strain Inner Skin at Stringer 5
104	Strain Inner Skin at Stringer 5
105	Strain Web Frame 184.0
106	Strain Web Frame 184.0
107	Strain Web Frame 184.0
108	Strain Web Frame 184.0
109	Strain Starboard Frame 186.5
110	Strain Starboard Frame 186.5
111	Strain Starboard Frame 187.0
112	Strain Starboard Frame 187.0
113	Strain Starboard Frame 187.0
114	Strain Starboard Frame 187.0
115	Strain Starboard Plate at Stringer 4
116	Strain Starboard Plate at Stringer 4A

TABLE 4

SENSOR LISTING

Data Acquisition System

M.V. Arctic

1979 Season

Channel Number	PARAMETER MEASURED AND LOCATION
117	Strain Starboard Plate at Stringer 5
118	Strain Starboard Frame 187.5
119	Strain Starboard Frame 188.5
120	Strain Starboard Frame 189.0
121	Strain Starboard Frame 189.0
122	Strain Starboard Frame 189.0
123	Strain Starboard Frame 189.0
124	Strain Starboard Frame 189.0
125	Strain Starboard Plate at Stringer 3
126	Strain Starboard Plate at Stringer 4
127	Spare Channel
128	Strain Starboard Frame 178.5
129	Strain Starboard Frame 179.0
130	Strain Starboard Frame 179.0
131	Strain Starboard Frame 179.0
132	Strain Starboard Frame 179.0
133	Strain Starboard Frame 179.0
134	Strain Starboard Frame 179.0
135	Strain Starboard Plate at Stringer 3
136	Strain Starboard Plate at Stringer 4
137	Strain Starboard Plate at Stringer 4A
138	Strain Starboard Plate at Stringer 5
139	Strain Starboard Frame 179.5
140	Strain Starboard Frame 180.5
141	Strain Starboard Frame 181.0
142	Strain Starboard Frame 181.0
143	Spare Channel
144	Strain Starboard Frame 181.0
145	Strain Starboard Frame 181.0

TABLE 4

SENSOR LISTING
Data Acquisition System
M.V. Arctic
1979 Season

Channel Number	PARAMETER MEASURED AND LOCATION
146	Strain Starboard Plate at Stringer 3
147	Strain Starboard Plate at Stringer 4
148	Strain Starboard Plate at Stringer 4A
149	Strain Starboard Plate at Stringer 5
150	Strain Starboard Frame 181.0
151	Strain Starboard Frame 181.0
152	Strain Starboard Frame 181.5
153	Strain Starboard Frame 182.5
154	Strain Starboard Frame 183.0
155	Strain Starboard Frame 183.0
156	Strain Starboard Frame 183.0
157	Strain Starboard Frame 183.0
158	Strain Starboard Frame 183.0
159	Spare Channel
160	Strain Starboard Frame 183.0
161	Strain Starboard Frame 183.0
162	Strain Starboard Frame 183.0
163	Strain Starboard Frame 183.0
164	Strain Starboard Frame 183.0
165	Strain Starboard Frame 183.0
166	Strain Starboard Frame 183.0
167	Strain Starboard Plate at Stringer 5
168	Strain Starboard Plate at Stringer 5
169	Strain Starboard Plate at Stringer 5
170	Strain Starboard Plate at Stringer 5
171	Spare Channel
172	Spare Channel
173	Strain Starboard Plate at Stringer 3
174	Strain Starboard Plate at Stringer 4

TABLE 4

SENSOR LISTING

Data Acquisition System

M.V. Arctic

1979 Season

Channel Number	PARAMETER MEASURED AND LOCATION
175	Spare Channel
176	Strain Starboard Frame 103A
177	Strain Starboard Frame 104A
178	Strain Starboard Frame 105A
179	Strain Starboard Plate at Stringer C
180	Strain Starboard Plate at Stringer C
181	Strain Starboard Plate at Stringer C
182	Strain Starboard Plate at Stringer C
183	Strain Starboard Plate at Stringer C
184	Strain Starboard Frame 106A
185	Strain Starboard Frame 107A
186	Spare Channel
187	Bubbler Pressure
188	Bubbler Pressure
198	Shaft Thrust
199	Fuel Rack Position
200	Rudder Angle Response
201	Propeller Pitch Response
202	Differential Pressure - Rudder
203	Differential Pressure - Rudder Propeller Pitch
204	Bubbler Valve Status
205	Bubbler Valve Status
206	Bubbler Valve Status
207	Spare Channel
208	Shaft Torque
209	Spare Channel
210	Spare Channel
211	Spare Channel
212	Acceleration - Surge - Aft

TABLE 4

SENSOR LISTING

Data Acquisition System

M.V. Arctic

1979 Season

Channel Number	PARAMETER MEASURED AND LOCATION
213	Acceleration - Sway - Aft
214	Acceleration - Heave - Aft
215	Spare Channel
216	Spare Channel
217	Spare Channel
224	Visibility
225	Cloud Cover
226	Ice Cover
227	Spare Channel
228	Barometric Pressure (0 -0.9 kPa)
229	Barometric Pressure (1 to 9 kPa)
230	Barometric Pressure (90 or 100 kPa)
231	Air Temperature
232	Rel. Humidity
233	Wind Speed
234	Wind Direction
235	Spare Channel
236	Ship Speed
237	Sine Ships Heading
238	Cosine Ships Heading
239	Pitch Angle
240	Roll Angle
241	Engine RPM
242	Shaft RPM
243	Space Channel
244	Propeller Pitch Command
245	Rudder Angle Command
246	Spare Channel
247	Spare Channel

TABLE 4

SENSOR LISTING

Data Acquisition System

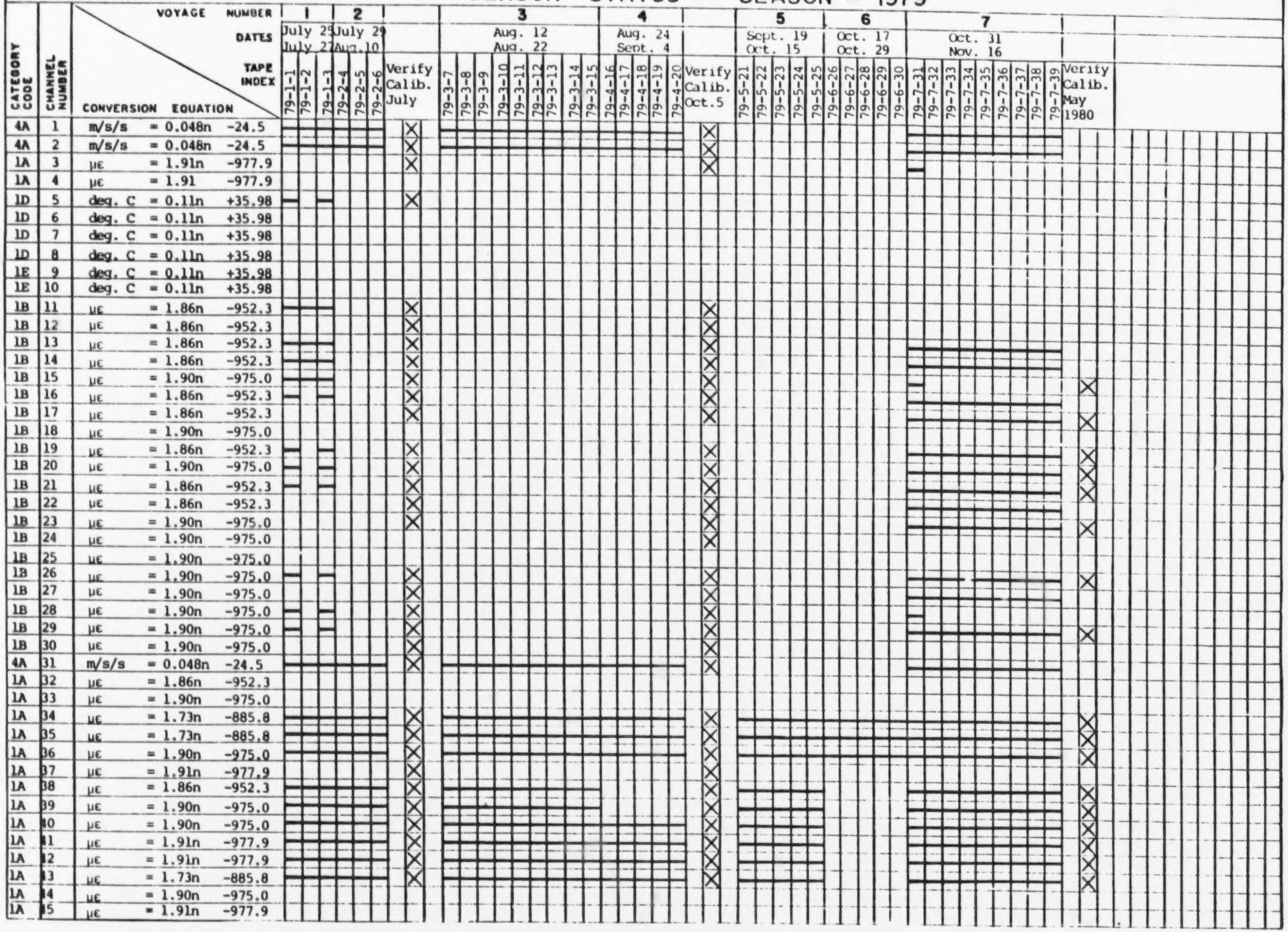
M.V. Arctic

1979 Season

Channel Number	PARAMETER MEASURED AND LOCATION
248	Spare Channel
249	Spare Channel
250	Spare Channel
251	Spare Channel
252	Ships Draught - Forward
253	Ships Draught - Aft
254	Spare Channel
255	Event Marker

TABLE 4

SENSOR STATUS — SEASON — 1979



CATEGORY CODE	CHANNEL NUMBER	CONVERSION EQUATION			Verify Calib. July	Verify Calib. Oct.5	Verify Calib. May 1980
4A	1	m/s/s	= 0.048n	-24.5	☒	☒	
4A	2	m/s/s	= 0.048n	-24.5	☒	☒	
1A	3	με	= 1.91n	-977.9	☒	☒	
1A	4	με	= 1.91	-977.9			
1D	5	deg. C	= 0.11n	+35.98	☒		
1D	6	deg. C	= 0.11n	+35.98			
1D	7	deg. C	= 0.11n	+35.98			
1D	8	deg. C	= 0.11n	+35.98			
1E	9	deg. C	= 0.11n	+35.98			
1E	10	deg. C	= 0.11n	+35.98			
1B	11	με	= 1.86n	-952.3	☒	☒	
1B	12	με	= 1.86n	-952.3	☒	☒	
1B	13	με	= 1.86n	-952.3	☒	☒	
1B	14	με	= 1.86n	-952.3	☒	☒	
1B	15	με	= 1.90n	-975.0	☒	☒	☒
1B	16	με	= 1.86n	-952.3	☒	☒	
1B	17	με	= 1.86n	-952.3	☒	☒	☒
1B	18	με	= 1.90n	-975.0			
1B	19	με	= 1.86n	-952.3	☒	☒	☒
1B	20	με	= 1.90n	-975.0	☒	☒	☒
1B	21	με	= 1.86n	-952.3	☒	☒	☒
1B	22	με	= 1.86n	-952.3	☒	☒	
1B	23	με	= 1.90n	-975.0	☒	☒	☒
1B	24	με	= 1.90n	-975.0		☒	
1B	25	με	= 1.90n	-975.0			
1B	26	με	= 1.90n	-975.0	☒	☒	☒
1B	27	με	= 1.90n	-975.0	☒	☒	
1B	28	με	= 1.90n	-975.0	☒	☒	
1B	29	με	= 1.90n	-975.0	☒	☒	☒
1B	30	με	= 1.90n	-975.0	☒	☒	
4A	31	m/s/s	= 0.048n	-24.5	☒	☒	
1A	32	με	= 1.86n	-952.3			
1A	33	με	= 1.90n	-975.0			
1A	34	με	= 1.73n	-885.8	☒	☒	☒
1A	35	με	= 1.73n	-885.8	☒	☒	☒
1A	36	με	= 1.90n	-975.0	☒	☒	☒
1A	37	με	= 1.91n	-977.9	☒	☒	
1A	38	με	= 1.86n	-952.3	☒	☒	☒
1A	39	με	= 1.90n	-975.0	☒	☒	☒
1A	40	με	= 1.90n	-975.0	☒	☒	☒
1A	41	με	= 1.91n	-977.9	☒	☒	☒
1A	42	με	= 1.91n	-977.9	☒	☒	☒
1A	43	με	= 1.73n	-885.8	☒	☒	☒
1A	44	με	= 1.90n	-975.0			
1A	45	με	= 1.91n	-977.9			

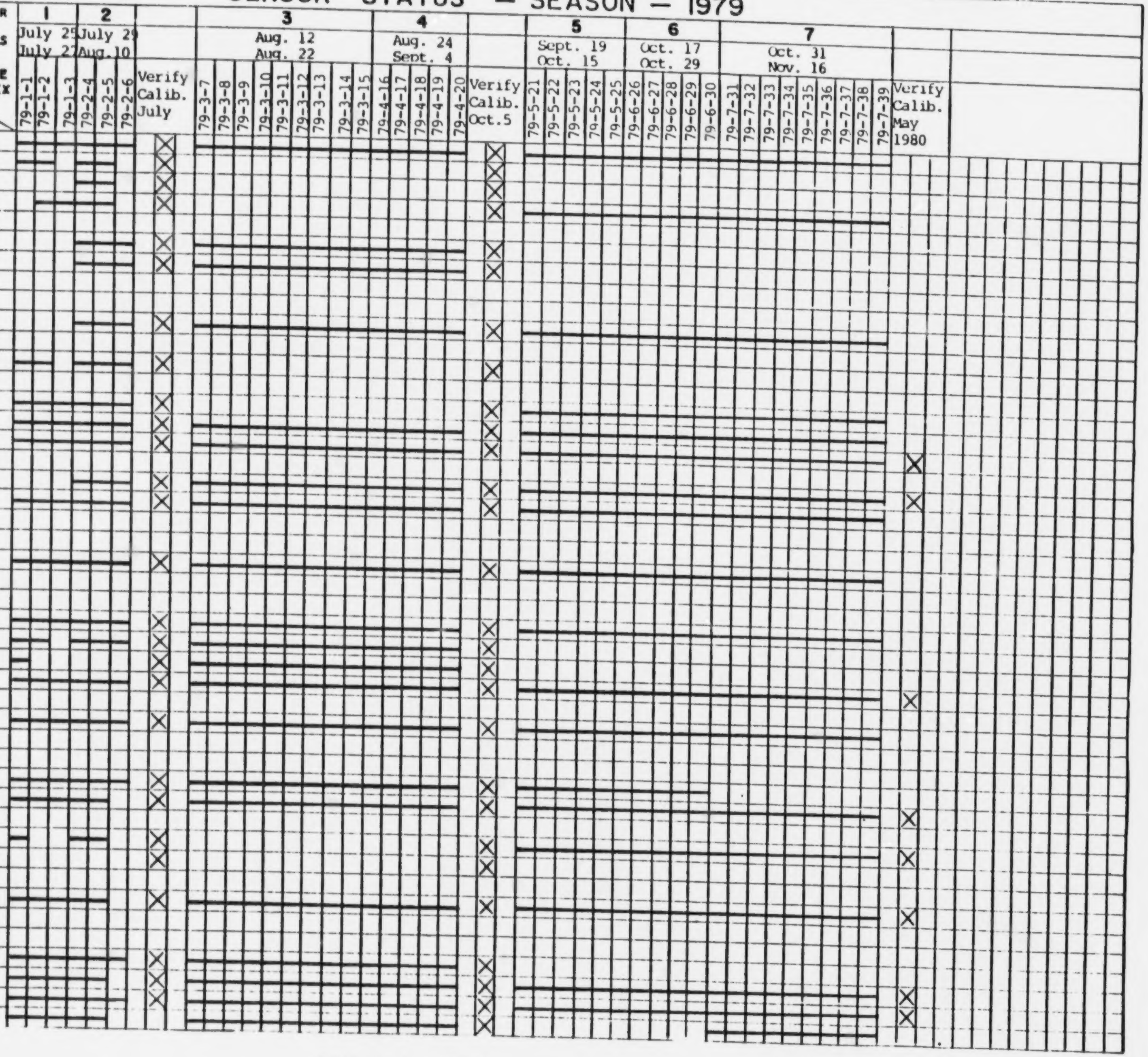
CHART NO. 1 - PAGE 1

SENSOR STATUS — SEASON — 1979

Category Code	Channel Number	Conversion Equation	Voyage Number 1	2	Verify Calib. July	3	4	Verify Calib. Oct.5	5	6	7	Verify Calib. May 1980
		Dates	July 25 July 27	July 29 Aug. 10		Aug. 12 Aug. 22	Aug. 24 Sept. 4		Sept. 19 Oct. 15	Oct. 17 Oct. 29	Oct. 31 Nov. 16	
		Tape Index	79-1-1 79-1-2	79-1-3 79-2-4 79-2-5 79 2-6		79-3-7 79-3-8 79-3-9 79-3-10 79-3-11 79-3-12 79-3-13 79-3-14 79-3-15	79-4-16 79-4-17 79-4-18 79-4-19 79-4-20		79-5-21 79-5-22 79-5-23 79-5-24 79-5-25	79-6-26 79-6-27 79-6-28 79-6-29 79-6-30	79-7-31 79-7-32 79-7-33 79-7-34 79-7-35 79-7-36 79-7-37 79-7-38 79-7-39	
1A	46	με = 1.86n -952.3	—	—	☒	—	—	☒	—	—	—	
1A	47	Spare										
1A	48	με = 1.73n -885.8	—	—	☒	—	—	☒	—	—	—	☒
1A	49	με = 1.86n -952.3	—		☒		—	☒				
1A	50	με = 1.91n -977.9										
1A	51	με = 1.90n -975.0										
1A	52	με = 1.90n -975.0	—	—	☒		—	☒	—	—	—	
1A	53	με = 1.90n -975.0	—	—	☒	—	—	☒	—	—	—	
1A	54	με = 1.86n -952.3										
1A	55	με = 1.91n -977.9										
1A	56	με = 1.90n -975.0										
1A	57	με = 1.86n -952.3										
1A	58	με = 1.91n -977.9	—	—	☒	—	—	☒				
1A	59	με = 1.91n -977.9	79-1-1	—	☒	—	—	☒	—	—	—	
1A	60	με = 1.86n -952.3	—	—	☒	—	—	☒	—	—		
1A	61	Spare										
1A	62	με = 1.90n -975.0										
1A	63	με = 1.90n -975.0	79-1-2	—	☒	—	—	☒	—	—	—	☒
1A	64	με = 1.91n -977.9										
1A	65	με = 1.91n -977.9	—	—	☒	—	—	☒	—	—	—	☒
1A	66	με = 1.91n -977.9										
1A	67	με = 1.90n -975.0										
1A	68	με = 1.91n -977.9										
1A	69	με = 1.86n -952.3	—	—	☒	—	—	☒	—	—	—	
1A	70	με = 1.91n -977.9										
1A	71	με = 1.86n -952.3	—	—	☒	—	—	☒	—	—	—	☒
1A	72	με = 1.90n -975.0	—	—	☒	—	—	☒	—	—	—	☒
1A	73	με = 1.90n -975.0			☒			☒	—	—	—	☒
1A	74	με = 1.91n -977.9			☒							
1A	75	με = 1.86n -952.3										
1A	76	με = 1.91n -977.9										
1A	77	με = 1.86n -952.3	—	—	☒	—	—	☒			—	
1A	78	με = 1.90n -975.0	—	—	☒	—	—	☒			—	☒
1A	79	με = 1.91n -977.9	—	—	☒	—	—	☒	—	—	—	
1A	80	με = 1.91n -977.9										
1A	81	με = 1.91n -977.9										
1A	82	με = 1.91n -977.9	—	—	☒	—	—	☒	—	—	—	
1A	83	με = 1.91n -977.9										
1A	84	με = 1.91n -977.9										
1A	85	με = 1.91n -977.9	—	—	☒	—	—	☒	—	—	—	☒
1A	86	με = 1.91n -977.9										
1A	87	με = 1.90n -975.0										
1A	88	με = 1.73n -885.8	—	—	☒	—	—	☒	—	—	—	
1A	89	με = 1.73n -885.8										
1A	90	με = 1.91n -977.9	—	—	☒	—	—	☒	—	—	—	☒

CHART NO. 1 - PAGE 2

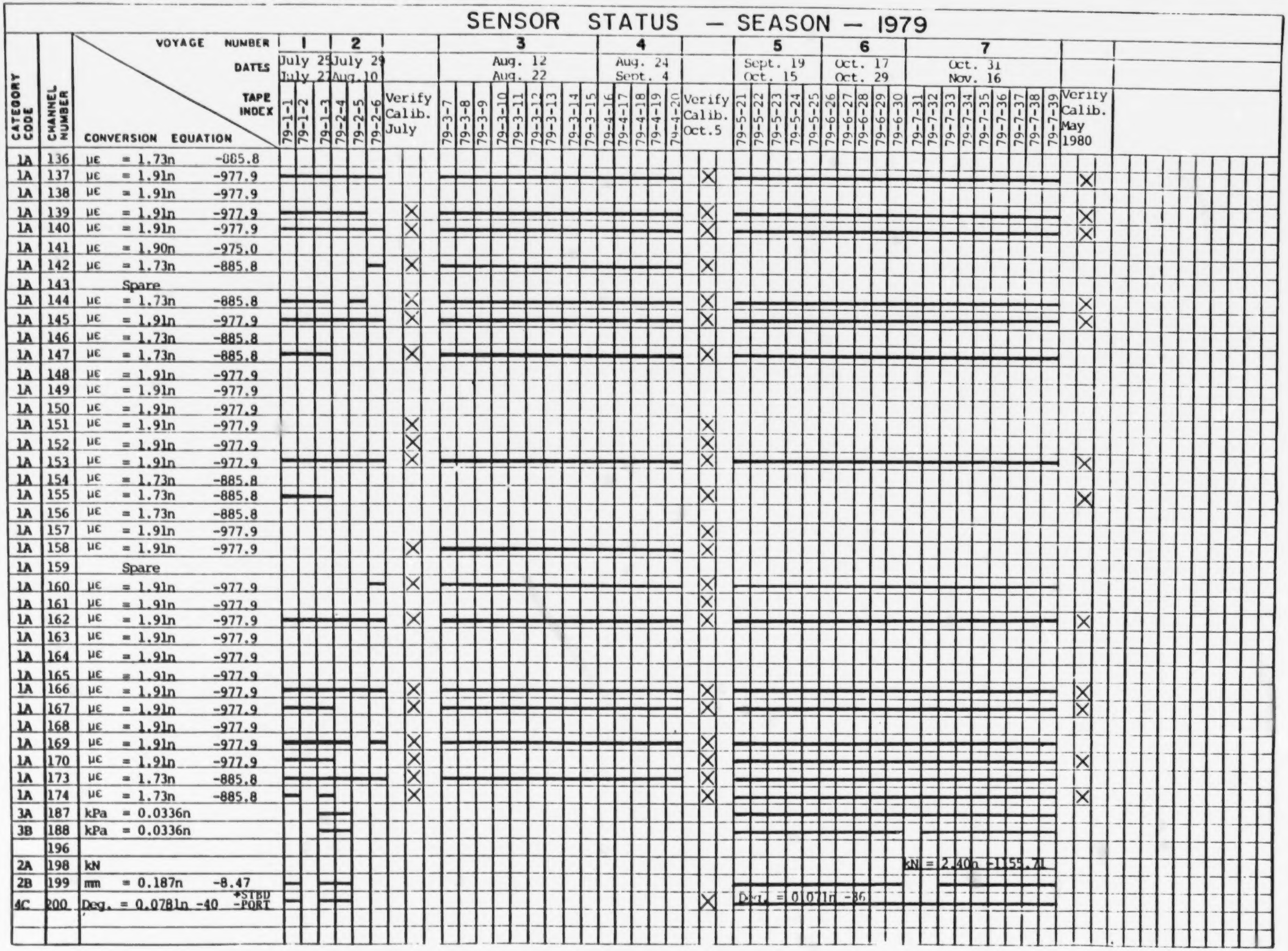
SENSOR STATUS — SEASON — 1979



CATEGORY CODE	CHANNEL NUMBER	CONVERSION EQUATION	Verify Calib. July	Verify Calib. Oct.5	Verify Calib. May 1980
1A	91	με = 1.91n -977.9	☒	☒	
1A	92	με = 1.91n -977.9	☒	☒	
1A	93	με = 1.73n -885.8	☒	☒	
1A	94	με = 1.73n -885.8	☒	☒	
1A	95	με = 1.91n -977.9			
1A	96	με = 1.91n -977.9	☒	☒	
1A	97	με = 1.91n -977.9	☒	☒	
1A	98	με = 1.91n -977.9			
1A	99	με = 1.91n -977.9			
1A	100	με = 1.91n -977.9	☒	☒	
1A	101	με = 1.91n -977.9			
1A	102	με = 1.91n -977.9	☒	☒	
1A	103	με = 1.91n -977.9			
1A	104	με = 1.91n -977.9	☒	☒	
1A	105	με = 1.91n -977.9	☒	☒	
1A	106	με = 1.91n -977.9	☒	☒	
1A	107	με = 1.91n -977.9			☒
1A	108	με = 1.91n -977.9	☒	☒	
1A	109	με = 1.73n -885.8	☒	☒	☒
1A	110	με = 1.91n -977.9			
1A	111	με = 1.73n -885.8			
1A	112	με = 1.91n -977.9	☒	☒	
1A	113	με = 1.91n -977.9			
1A	114	με = 1.91n -977.9			
1A	115	με = 1.73n -885.8	☒	☒	
1A	116	με = 1.91n -977.9	☒	☒	
1A	117	με = 1.91n -977.9	☒	☒	
1A	118	με = 1.91n -977.9	☒	☒	
1A	119	με = 1.73n -885.8			☒
1A	120	με = 1.86n -952.3	☒	☒	
1A	121	με = 1.91n -977.9			
1A	122	με = 1.86n -952.3			
1A	123	με = 1.90n -975.0	☒	☒	
1A	124	με = 1.90n -975.0	☒	☒	
1A	125	με = 1.73n -885.8			☒
1A	126	με = 1.90n -975.0	☒	☒	
1A	127	με = 1.90n -975.0	☒	☒	☒
1A	128	με = 1.91n -977.9			
1A	129	με = 1.73n -885.8	☒	☒	
1A	130	με = 1.73n -885.8			☒
1A	131	με = 1.73n -885.8			
1A	132	με = 1.91n -977.9	☒	☒	
1A	133	με = 1.91n -977.9	☒	☒	
1A	134	με = 1.91n -977.9	☒	☒	☒
1A	135	με = 1.73n -885.8		☒	☒

CHART NO. 1 - PAGE 3

SENSOR STATUS – SEASON – 1979



VOYAGE NUMBER
1
July 25
July 27
2
July 29
Aug. 10
3
Aug. 12
Aug. 22
4
Aug. 24
Sept. 4
5
Sept. 19
Oct. 15
6
Oct. 17
Oct. 29
7
Oct. 31
Nov. 16
DATES
TAPE INDEX
79-1-1
79-1-2
79-1-3
79-2-4
79-2-5
79-2-6
79-3-7
79-3-8
79-3-9
79-3-10
79-3-11
79-3-12
79-3-13
79-3-14
79-3-15
79-4-16
79-4-17
79-4-18
79-4-19
79-4-20
79-5-21
79-5-22
79-5-23
79-5-24
79-5-25
79-6-26
79-6-27
79-6-28
79-6-29
79-6-30
79-7-31
79-7-32
79-7-33
79-7-34
79-7-35
79-7-36
79-7-37
79-7-38
79-7-39
kN = 2.40n -1155.71
Deg. = 0.071n -86

CATEGORY CODE	CHANNEL NUMBER	CONVERSION EQUATION	Verify Calib. July	Verify Calib. Oct.5	Verify Calib. May 1980
1A	136	με = 1.73n -885.8			
1A	137	με = 1.91n -977.9		☒	☒
1A	138	με = 1.91n -977.9			
1A	139	με = 1.91n -977.9	☒	☒	☒
1A	140	με = 1.91n -977.9	☒	☒	☒
1A	141	με = 1.90n -975.0			
1A	142	με = 1.73n -885.8	☒	☒	
1A	143	Spare			
1A	144	με = 1.73n -885.8	☒	☒	☒
1A	145	με = 1.91n -977.9	☒	☒	☒
1A	146	με = 1.73n -885.8			
1A	147	με = 1.73n -885.8	☒	☒	
1A	148	με = 1.91n -977.9			
1A	149	με = 1.91n -977.9			
1A	150	με = 1.91n -977.9			
1A	151	με = 1.91n -977.9	☒	☒	
1A	152	με = 1.91n -977.9	☒	☒	
1A	153	με = 1.91n -977.9	☒	☒	☒
1A	154	με = 1.73n -885.8			
1A	155	με = 1.73n -885.8		☒	☒
1A	156	με = 1.73n -885.8			
1A	157	με = 1.91n -977.9		☒	
1A	158	με = 1.91n -977.9	☒	☒	
1A	159	Spare			
1A	160	με = 1.91n -977.9	☒	☒	
1A	161	με = 1.91n -977.9		☒	
1A	162	με = 1.91n -977.9	☒	☒	☒
1A	163	με = 1.91n -977.9			
1A	164	με = 1.91n -977.9			
1A	165	με = 1.91n -977.9			
1A	166	με = 1.91n -977.9	☒	☒	☒
1A	167	με = 1.91n -977.9	☒	☒	☒
1A	168	με = 1.91n -977.9			
1A	169	με = 1.91n -977.9	☒	☒	
1A	170	με = 1.91n -977.9	☒	☒	☒
1A	173	με = 1.73n -885.8	☒	☒	
1A	174	με = 1.73n -885.8	☒	☒	☒
3A	187	kPa = 0.0336n			
3B	188	kPa = 0.0336n			
	196				
2A	198	kN			
2B	199	mm = 0.187n -8.47			
4C	200	Deg. = 0.0781n -40 +STBD -PORT		☒	

CHART NO. 1 - PAGE 4

SENSOR STATUS – SEASON – 1979

CATEGORY CODE	CHANNEL NUMBER	CONVERSION EQUATION	Verify Calib. Oct.5
2C	201	Deg. = 0.0195n -10 +Ahead -Astern	
4D	202	MPa = 0.00336n	
2D	203	MPa = 0.00135n	
3C	204		
3C	205		
3C	206		
2E	208	kNm = 0.92n -320.1	
4B	212	m/s/s = 0.048n -24.5	
4B	213	m/s/s = 0.048n -24.5	
4B	214	m/s/s = 0.048n -24.5	
5H	224	miles = 0.0098n	☒
5A	225	tenths = 0.0098n	☒
5B	226	tenths = 0.0098n	☒
5C	228	kPa = 0.0098n	☒
5C	229	kPa = 0.0098n	☒
5C	230	kPa = 0.0098n	☒
5D	231	deg. C = 0.195n -100	☒
5E	232	% = 0.098n	☒
5F	233	Knots	☒
5G	234	deg. = -0.35n +360	☒
4E	236	Knots = 0.0196n +0.86	
4F	237 238	deg. = ARCTAN $\frac{n_{237}-512}{n_{238}-512}$	
4G	239		
4H	240		☒
2F	241	RPM = 0.55n -4	
	242		
	243		
2H	244	Deg. = 0.0195n -10 +Ahead -Astern	☒
4L	245	Deg. = 0.0781n -40 +Stbd -Port	☒
4J	252	M = 0.003n +7.93	☒
4K	253	M = 0.003n +7.93	☒

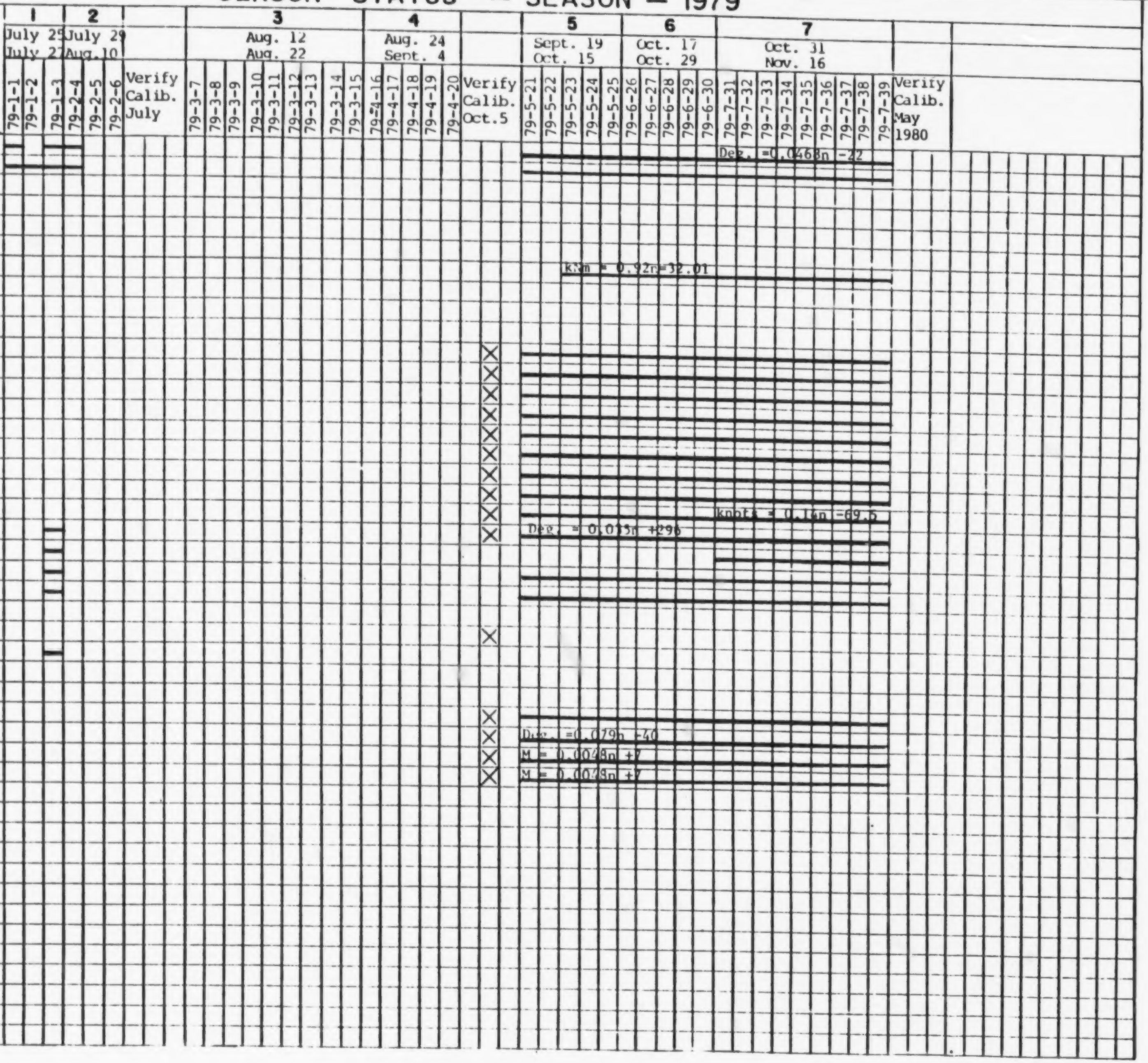


CHART NO. 1 - PAGE 5

SENSOR LISTING

Data Acquisition System

M.V. Arctic

1980 Season

Channel Number	PARAMETER MEASURED AND LOCATION
1	Accelerations -Heave -Forward
2	Accelerations -Sway -Forward
3	Strain - Starboard Frame 200.5
4	Strain - Starboard Frame 201.5
5	Hull Temperature
6	Hull Temperature
7	Hull Temperature
8	Hull Temperature
9	Hull Temperature
10	Hull Temperature
11	Filtered Output Channel 1
12	Filtered Output Channel 2
13	Filtered Output Channel 31
14	Strain Port Frame 181.0
15	Strain Port Plate at Stringer 4
16	Strain Port Plate at Stringer 5
17	Strain Port Plate at Stringer 4A
18	Strain Port Frame 183.0
19	Strain Port Frame 185.0
20	Strain Port Plate at Stringer 5
21	Strain Port Frame 187.0
22	Strain Port Plate at Stringer 4A
23	Strain Port Frame 189.0
24	Strain Port Plate at Stringer 5
25	Strain Port Plate at Stringer 5
26	Strain Port Frame 191.0
27	Strain Port Plate at Stringer 4A
28	Strain Port Frame 194.5
29	Strain Port Frame 195.0

TABLE 5

SENSOR LISTING
Data Acquisition System
M.V. Arctic
1980 Season

Channel Number	PARAMETER MEASURED AND LOCATION
30	Strain Port Plate at Stringer 5
31	Accelerations - Surge - Forward
32	Strain Starboard Plate at Stringer 4A
33	Strain Starboard Plate at Stringer 5
34	Strain Starboard Frame 189.5
35	Strain Starboard Frame 190.5
36	Strain Starboard Frame 191.0
37	Strain Starboard Frame 191.0
38	Strain Starboard Frame 191.0
39	Strain Starboard Frame 191.0
40	Strain Starboard Frame 191.0
41	Strain Starboard Frame 191.0
42	Strain Starboard Frame 191.0
43	Strain Starboard Plate at Stringer 3
44	Strain Starboard Plate at Stringer 4
45	Strain Starboard Plate at Stringer 4A
46	Strain Starboard Plate at Stringer 5
47	Spare Channel
48	Strain - Starboard Frame 191.5
49	Strain Starboad Frame 192.5
50	Strain Starboard Frame 192.5
51	Strain Starboard Frame 193.0
52	Strain Starboard Frame 193.0 or Filtered Output Channel 32
53	Filtered Output Channel 37 or 45
54	Strain Starboard Plate at Stringer 4
55	Strain Starboard Plate at Stringer 4A
56	Strain Starboard Plate at Stringer 5
57	Strain Starboard Frame 193.5
58	Strain Starboard Frame 193.5

TABLE 5

SENSOR LISTING

Data Acquisition System

M.V. Arctic

1980 Season

Channel Number	PARAMETER MEASURED AND LOCATION
59	Strain Starboard Frame 194.5
60	Strain Starboard Frame 194.5
61	Filtered Output Channel 45
62	Strain Starboard Frame 195.0
63	Strain Starboard Frame 195.0
64	Filtered Output Channel 55
65	Filtered Output Channel 58
66	Strain Starboard Plate at Stringer 4A
67	Strain Starboard Plate at Stringer 5
68	Strain Starboard Frame 195.5
69	Strain Starboard Frame 195.5
70	Strain Starboard Frame 196.5
71	Strain Starboard Frame 197.0
72	Strain Starboard Frame 197.0
73	Strain Starboard Frame 197.0
74	Strain Starboard Plate at Stringer 4A
75	Strain Starboard Plate at Stringer 5
76	Strain Starboard Frame 197.5
77	Strain Starboard Frame 198.5
78	Strain Starboard Frame 199.0
79	Strain Starboard Frame 199.5
80	Strain Starboard Plate at Stringer 4A
81	Strain Starboard Plate at Stringer 4A
82	Strain Starboard Plate at Stringer 4A
83	Strain Starboard Plate at Stringer 4A
84	Strain Starboard Plate at Stringer 5
85	Strain Starboard Frame 183.5
86	Strain Starboard Frame 184.5
87	Strain Starboard Frame 185.0

TABLE 5

SENSOR LISTING

Data Acquisition System

M.V. Arctic

1980 Season

Channel Number	PARAMETER MEASURED AND LOCATION
117	Strain Starboard Plate at Stringer 5
118	Strain Starboard Frame 187.5
119	Strain Starboard Frame 188.5
120	Strain Starboard Frame 189.0
121	Strain Starboard Frame 189.0
122	Strain Starboard Frame 189.0 or Filtered Output Channels 97
123	Strain Starboard Frame 189.0 or Filtered Ouput Channesl 116 or 90
124	Filtered Output Channel 116
125	Strain Starboard Plate at Stringer 3 and Filtered Output Channel 121
126	Strain Starboard Plate at Stringer 4
127	Spare Channel
128	Strain Starboard Frame 178.5
129	Strain Starboard Frame 179.0
130	Strain Starboard Frame 179.0
131	Strain Starboard Frame 179.0
132	Strain Starboard Frame 179.0
133	Strain Starboard Frame 179.0
134	Strain Starboard Frame 179.0
135	Strain Starboard Plate at Stringer 3
136	Strain Starboard Plate at Stringer 4
137	Strain Starboard Plate at Stringer 4A
138	Strain Starboard Plate at Stringer 5
139	Strain Starboard Frame 179.5
140	Strain Starboard Frame 180.5
141	Strain Starboard Frame 181.0
142	Strain Starboard Frame 181.0
143	Spare Channel

TABLE 5

SENSOR LISTING

Data Acquisition System

M.V. Arctic

1980 Season

Channel Number	PARAMETER MEASURED AND LOCATION
88	Strain Starboard Frame 185.0
89	Strain Starboard Frame 185.0
90	Strain Starboard Frame 185.0
91	Strain Starboard Frame 185.0
92	Strain Starboard Frame 185.0
93	Strain Starboard Plate at Stringer 3
94	Strain Starboard Plate at Stringer 4
95	Strain Starboard Plate at Stringer 4A
96	Strain Starboard Plate at Stringer 4A
97	Strain Starboard Plate at Stringer 4A
98	Strain Starboard Plate at Stringer 4A
99	Strain Starboard Plate at Stringer 5
100	Strain Starboard Frame 185.5
101	Strain Inner Skin at Stringer 5
102	Strain Inner Skin at Stringer 5
103	Strain Inner Skin at Stringer 5
104	Strain Inner Skin at Stringer 5
105	Strain Web Frame 184.0
106	Strain Web Frame 184.0
107	Filtered Output Channel 81
108	Strain Web Frame 184.0
109	Filtered Output Channel 90
110	Strain Starboard Frame 186.5
111	Strain Starboard Frame 187.0
112	Strain Starboard Frame 187.0
113	Strain Starboard Frame 187.0
114	Strain Starboard Frame 187.0
115	Strain Starboard Plate at Stringer 4
116	Strain Starboard Plate at Stringer 4A

TABLE 5

SENSOR LISTING

Data Acquisition System

M.V. Arctic

1980 Season

Channel Number	PARAMETER MEASURED AND LOCATION
144	Strain Starboard Frame 181.0
145	Strain Starboard Frame 181.0
146	Strain Starboard Plate at Stringer 3
147	Strain Starboard Plate at Stringer 4
148	Strain Starboard Plate at Stringer 4A
149	Strain Starboard Plate at Stringer 5
150	Strain Starboard Frame 181.0
151	Strain Starboard Frame 181.0
152	Strain Starboard Frame 181.5
153	Strain Starboard Frame 182.5
154	Strain Starboard Frame 183.0
155	Strain Starboard Frame 183.0
156	Strain Starboard Frame 183.0
157	Strain Starboard Frame 183.0
158	Strain Starboard Frame 183.0
159	Spare Channel
160	Strain Starboard Frame 183.0
161	Strain Starboard Frame 183.0
162	Strain Starboard Frame 183.0
163	Strain Starboard Frame 183.0
164	Strain Starboard Frame 183.0 or Filtered Output Channel 145 or 160
165	Strain Starboard Frame 183.0 or Filtered Output Channel 132 or 145
166	Strain Starboard Frame 183.0
167	Strain Starboard Plate at Stringer 5
168	Strain Starboard Plate at Stringer 5
169	Strain Starboard Plate at Stringer 5
170	Strain Starboard Plate at Stringer 5

TABLE 5

SENSOR LISTING

Data Acquisition System

M.V. Arctic

1980 Season

Channel Number	PARAMETER MEASURED AND LOCATION
171	Spare Channel
172	Spare Channel
173	Strain Starboard Plate at Stringer 3 or Filtered Output Channel 148
174	Strain Starboard Plate at Stringer 4
175	Spare Channel
176	Strain A Midship Deck Beam - M3
177	Strain A Midship Deck Beam - M2
178	Strain A Midship Deck Beam - M1
179	Strain C Midship Deck Beam - M4
180	Strain Starboard Plate at Stringer C
181	Strain Starboard Plate at Stringer C
182	Strain Starboard Plate at Stringer C
183	Strain Starboard Plate at Stringer C
184	Strain Starboard Frame 106A
185	Strain Starboard Frame 107A
186	Spare Channel
187	Bubbler Pressure
188	Bubbler Pressure
198	Shaft Thrust
199	Fuel Rack Position
200	Rudder Angle Response
201	Propeller Pitch Response
202	Differential Pressure - Rudder
203	Differential Pressure - Rudder Propeller Pitch
204	Bubbler Valve Status
205	Bubbler Valve Status
206	Bubbler Valve Status
207	Spare Channel

TABLE 5

SENSOR LISTING

Data Acquisition System
M.V. Arctic
1980 Season

Channel Number	PARAMETER MEASURED AND LOCATION
208	Shaft Torque
209	Shaft Revolutions - Coil
210	Spare Channel
211	Spare Channel
212	Acceleration - Surge - Aft
213	Acceleration - Sway - Aft
214	Acceleration - Heave - Aft
215	Filtered Output Channel 212
216	Filtered Output Channel 213
217	Filtered Output Channel 214
224	Visibility
225	Cloud Cover
226	Ice Cover
227	Spare Channel
228	Barometric Pressure (0 to 0.9 kPa)
229	Barometric Pressure (1 to 9 kPa)
230	Barometric Pressure (90 or 100 kPa)
231	Air Temperature
232	Rel. Humidity
233	Wind Speed
234	Wind Direction
235	Spare Channel
236	Ship Speed
237	Sine Ships Heading
238	Cosine Ships Heading
239	Pitch Angle
240	Roll Angle
241	Engine RPM
242	Shaft RPM

TABLE 5

SENSOR LISTING

Data Acquisition System

M.V. Arctic

1980 Season

Channel Number	PARAMETER MEASURED AND LOCATION
243	Space Channel
244	Propeller Pitch Command
245	Rudder Angle Command
246	Spare Channel
247	Spare Channel
248	Spare Channel
249	Spare Channel
250	Spare Channel
251	Spare Channel
252	Ships Draught - Forward
253	Ships Draught - Aft
254	Spare Channel
255	Event Marker

TABLE 5

SENSOR STATUS — SEASON — 1980

CATEGORY CODE	CHANNEL NUMBER	VOYAGE NUMBER					1					2				4					5				6				
		DATES					Aug. 10 Aug. 18					Sept. 3 Sept. 15				Oct. 3 Oct. 13					Oct. 16 Oct. 25				Nov. 3 Nov. 9				
		TAPE INDEX / CONVERSION EQUATION	Verify Calib. May 3	Replace Sensors May/ June	Verify Calib. July 3	Verify Calib. July	80-1-1	80-1-2	80-1-3	80-1-4	80-1-5	80-2-6	80-2-7	80-2-8	80-2-9	80-4-10	80-4-11	80-4-12	80-4-13	80-4-14	80-5-15	80-5-16	80-5-17	Verify Calib. Nov.	80-6-18	80-6-19	80-6-20	80-6-21	Verify June 16 1981
4A	1	m/s/s = 0.048n -24.5				X		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—	
4A	2	m/s/s = 0.048n -24.5				X		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—	
1A	3	= 3.82n -1955.8																											
1A	4	= 3.82n -1955.8																											
1D	5	deg. C = 0.11n +35.98						—	—	—	—					—	—	—	—	—	—	—	—		—	—	—	—	
1D	6	deg. C = 0.11n +35.98						—	—	—	—					—	—	—	—	—	—	—	—				—	—	
1D	7	deg. C = 0.11n +35.98						—	—	—	—					—	—	—	—	—	—	—	—				—	—	
1D	8	deg. C = 0.11n +35.98						—	—	—	—					—	—	—	—	—	—	—	—				—	—	
1D	9	deg. C = 0.11n +35.98																											
1D	10	deg. C = 0.11n +35.98																											
4N	11	με = 3.72n -1904.6														F-1			—		—	—	—		—	—	—	—	
4N	12	με = 3.72n -1904.6														F-2			—		—	—	—		—	—	—	—	
4N	13	με = 3.72n -1904.6														F-31			—		—	—	—		—	—	—	—	
1B	14	με = 3.72n -1904.6																											
1B	15	με = 3.80n -1950.0	X		X																								
1B	16	με = 3.72n -1904.6																											
1B	17	με = 3.72n -1904.6	X		X			—	—	—	—	—		—	—	—	—	—	—	—	—	—	—		—	—	—	—	
1B	18	με = 3.80n -1950.0																											
1B	19	με = 3.72n -1904.6	X		X			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—	X
1B	20	με = 3.80n -1950.0	X		X			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—	X
1B	21	με = 3.72n -1904.6	X		X			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—	X
1B	22	με = 3.72n -1904.6																											
1B	23	με = 3.80n -1950.0	X		X																								
1B	24	με = 3.80n -1950.0																											
1B	25	με = 3.80n -1950.0																											
1B	26	με = 3.80n -1950.0	X		X			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—	X
1B	27	με = 3.80n -1950.0																											
1B	28	με = 3.80n -1950.0																											
1B	29	με = 3.80n -1950.0	X		X			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—	
1B	30	με = 3.80n -1950.0																											
4A	31	m/s/s = 0.04n -24.5				X		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—	
1A	32	με = 3.58n -1830.0		X	X			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—	
1A	33	με = 3.58n -1830.0		X	X			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—	
1A	34	με = 3.46n -1771.6	X		X			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—	
1A	35	με = 3.46n -1771.6	X		X			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—	
1A	36	με = 3.80n -1950.0	X		X			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—	
1A	37	με = 3.58n -1830.0		X	X			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—	
1A	38	με = 3.72n -1904.6	X		X			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—	
1A	39	με = 3.80n -1950.0	X		X			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—	X
1A	40	με = 3.80n -1950.0	X		X			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—	X
1A	41	με = 3.82n -1155.8	X		X			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—	X
1A	42	με = 3.82n -1155.8	X		X			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—	X
1A	43	με = 3.46n -1771.6	X		X			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—	X
1A	44	με = 3.58n -1830.0		X	X											—	—	—	—	—							—	—	X
1A	45	με = 3.58n -1830.0		X	X			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—	X

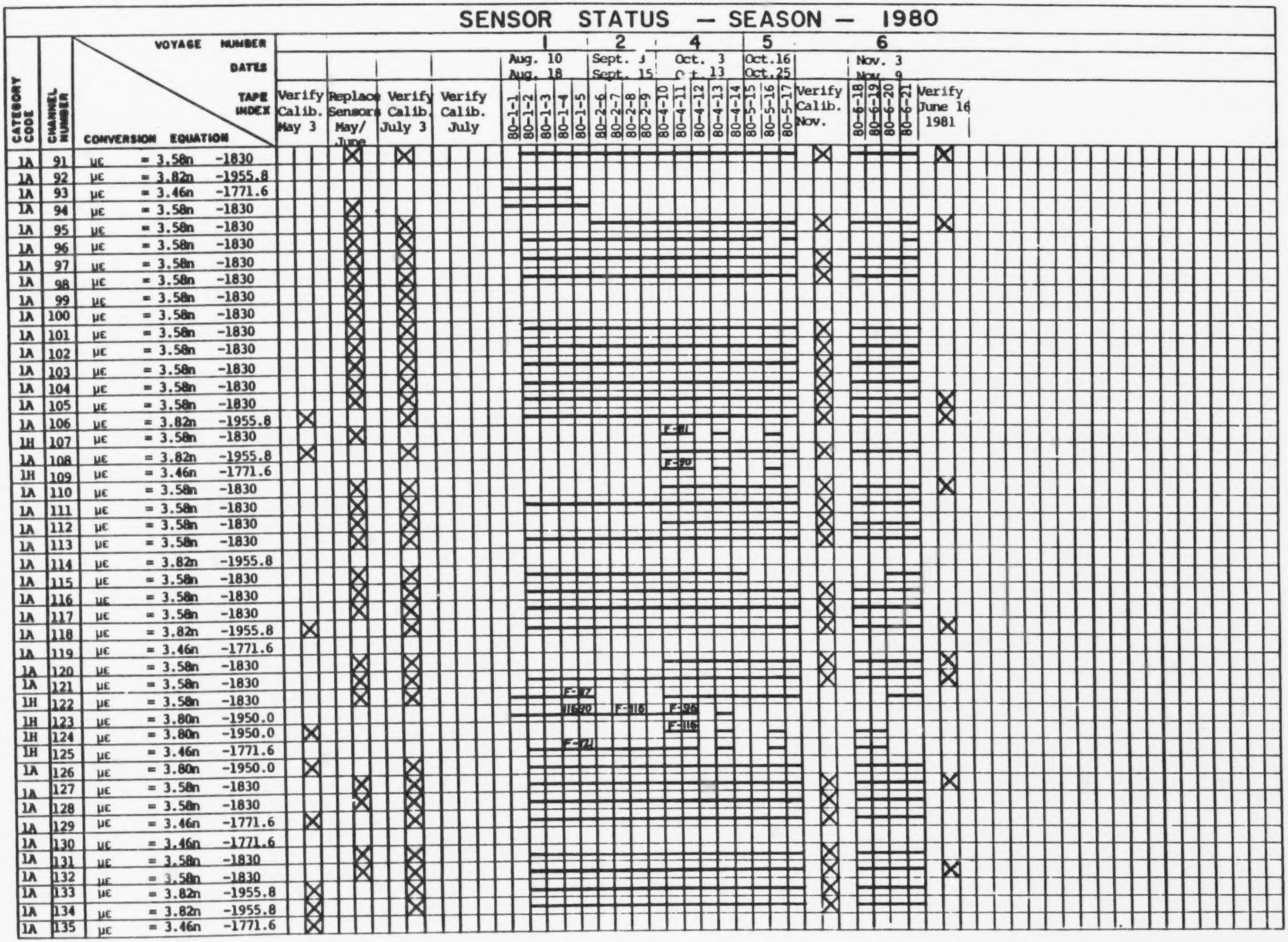
Chart 2 - Page 1

SENSOR STATUS — SEASON — 1980

CATEGORY CODE	CHANNEL NUMBER	CONVERSION EQUATION	Verify Calib. May 3	Replace Sensors May/June	Verify Calib. July 3	Verify Calib. July	1 Aug. 10 Aug. 18 80-1-1 80-1-2 80-1-3 80-1-4 80-1-5	2 Sept. 3 Sept. 15 80-2-6 80-2-7 80-2-8 80-2-9	4 Oct. 3 Oct. 13 80-4-10 80-4-11 80-4-12 80-4-13 80-4-14	5 Oct.16 Oct.25 80-5-15 80-5-16 80-5-17	Verify Calib. Nov.	6 Nov. 3 Nov. 9 80-6-18 80-6-19 80-6-20 80-6-21	Verify June 16 1981
1A	46	$\mu\epsilon = 3.58n - 1830.0$		X	X						X		
1A	47												
1A	48	$\mu\epsilon = 3.46n - 1771.6$	X		X						X		X
1A	49	$\mu\epsilon = 3.58n - 1830.0$		X	X						X		
1A	50	$\mu\epsilon = 3.58n - 1830.0$		X	X						X		X
1A	51	$\mu\epsilon = 3.58n - 1830.0$		X	X						X		
1H	52	$\mu\epsilon = 3.80n - 1950.0$					F-47						
1H	53	$\mu\epsilon = 3.80n - 1950.0$							F-45				X
1A	54	$\mu\epsilon = 3.58n - 1830.0$		X	X						X		
1A	55	$\mu\epsilon = 3.58n - 1830.0$		X	X						X		
1A	56	$\mu\epsilon = 3.58n - 1830.0$		X	X						X		
1A	57	$\mu\epsilon = 3.58n - 1830.0$		X	X						X		
1A	58	$\mu\epsilon = 3.58n - 1830.0$		X	X						X		X
1A	59	$\mu\epsilon = 3.58n - 1830.0$		X	X						X		X
1A	60	$\mu\epsilon = 3.58n - 1830.0$		X	X						X		
1H	61						F-45						
1A	62	$\mu\epsilon = 3.80n - 1950.0$											
1A	63	$\mu\epsilon = 3.80n - 1950.0$	X		X						X		X
1H	64	$\mu\epsilon = 3.82n - 1955.8$							F-55				
1H	65	$\mu\epsilon = 3.82n - 1955.8$	X						F-51				
1A	66	$\mu\epsilon = 3.58n - 1830.0$		X	X						X		X
1A	67	$\mu\epsilon = 3.58n - 1830.0$		X	X						X		X
1A	68	$\mu\epsilon = 3.58n - 1830.0$		X	X						X		X
1A	69	$\mu\epsilon = 3.58n - 1830.0$		X	X						X		X
1A	70	$\mu\epsilon = 3.58n - 1830.0$		X	X						X		X
1A	71	$\mu\epsilon = 3.72n - 1904.6$	X		X						X		X
1A	72	$\mu\epsilon = 3.80n - 1950.0$	X		X						X		X
1A	73	$\mu\epsilon = 3.80n - 1950.0$	X		X						X		
1A	74	$\mu\epsilon = 3.58n - 1830.0$		X	X						X		
1A	75	$\mu\epsilon = 3.58n - 1830.0$		X	X						X		
1A	76	$\mu\epsilon = 3.58n - 1830.0$		X	X						X		
1A	77	$\mu\epsilon = 3.72n - 1904.6$											
1A	78	$\mu\epsilon = 3.80n - 1950.0$	X		X								X
1A	79	$\mu\epsilon = 3.82n - 1955.8$											
1A	80	$\mu\epsilon = 3.58n - 1830.0$		X	X								
1A	81	$\mu\epsilon = 3.58n - 1830.0$		X	X						X		
1A	82	$\mu\epsilon = 3.58n - 1830.0$		X	X						X		
1A	83	$\mu\epsilon = 3.58n - 1830.0$		X	X						X		
1A	84	$\mu\epsilon = 3.58n - 1830.0$		X	X								
1A	85	$\mu\epsilon = 3.82n - 1955.8$	X		X						X		X
1A	86	$\mu\epsilon = 3.58n - 1830.0$		X	X						X		
1A	87	$\mu\epsilon = 3.82n - 1950.0$											
1A	88	$\mu\epsilon = 3.46n - 1771.6$											
1A	89	$\mu\epsilon = 3.58n - 1830.0$		X	X						X		X
1A	90	$\mu\epsilon = 3.82n - 1955.8$	X		X						X		X

Chart 2 - Page 2

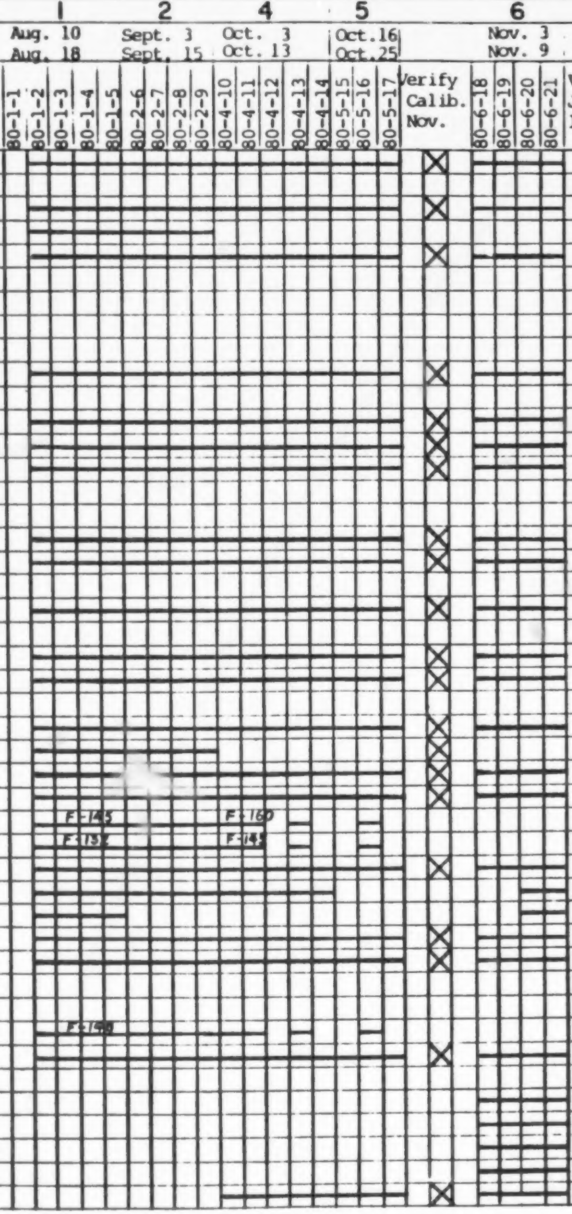
SENSOR STATUS — SEASON — 1980


VOYAGE NUMBER
DATES
TAPE INDEX
1
Aug. 10
Aug. 18
80-1-1
80-1-2
80-1-3
80-1-4
80-1-5
2
Sept. 3
Sept. 15
80-2-6
80-2-7
80-2-8
80-2-9
4
Oct. 3
Oct. 13
80-4-10
80-4-11
80-4-12
80-4-13
80-4-14
5
Oct.16
Oct.25
80-5-15
80-5-16
80-5-17
6
Nov. 3
Nov. 9
80-6-18
80-6-19
80-6-20
80-6-21
F-91
F-90
F-97
11680
F-118
F-96
F-116
F-121

CATEGORY CODE	CHANNEL NUMBER	CONVERSION EQUATION		Verify Calib. May 3	Replace Sensors May/June	Verify Calib. July 3	Verify Calib. July	Verify Calib. Nov.	Verify June 16 1981
1A	91	µε = 3.58n	-1830		☒	☒		☒	☒
1A	92	µε = 3.82n	-1955.8						
1A	93	µε = 3.46n	-1771.6						
1A	94	µε = 3.58n	-1830		☒				
1A	95	µε = 3.58n	-1830		☒	☒		☒	☒
1A	96	µε = 3.58n	-1830		☒	☒			
1A	97	µε = 3.58n	-1830		☒	☒		☒	
1A	98	µε = 3.58n	-1830		☒	☒		☒	
1A	99	µε = 3.58n	-1830		☒	☒			
1A	100	µε = 3.58n	-1830		☒	☒			
1A	101	µε = 3.58n	-1830		☒	☒		☒	
1A	102	µε = 3.58n	-1830		☒	☒		☒	
1A	103	µε = 3.58n	-1830		☒	☒		☒	
1A	104	µε = 3.58n	-1830		☒	☒		☒	
1A	105	µε = 3.58n	-1830		☒	☒		☒	☒
1A	106	µε = 3.82n	-1955.8	☒		☒		☒	☒
1H	107	µε = 3.58n	-1830		☒				
1A	108	µε = 3.82n	-1955.8	☒		☒		☒	
1H	109	µε = 3.46n	-1771.6						
1A	110	µε = 3.58n	-1830		☒	☒		☒	☒
1A	111	µε = 3.58n	-1830		☒	☒		☒	
1A	112	µε = 3.58n	-1830		☒	☒		☒	
1A	113	µε = 3.58n	-1830		☒	☒		☒	
1A	114	µε = 3.82n	-1955.8						
1A	115	µε = 3.58n	-1830		☒	☒			
1A	116	µε = 3.58n	-1830		☒	☒		☒	
1A	117	µε = 3.58n	-1830		☒	☒		☒	
1A	118	µε = 3.82n	-1955.8	☒		☒		☒	☒
1A	119	µε = 3.46n	-1771.6						
1A	120	µε = 3.58n	-1830		☒	☒		☒	☒
1A	121	µε = 3.58n	-1830		☒	☒		☒	☒
1H	122	µε = 3.58n	-1830		☒	☒			
1H	123	µε = 3.80n	-1950.0						
1H	124	µε = 3.80n	-1950.0	☒					
1H	125	µε = 3.46n	-1771.6						
1A	126	µε = 3.80n	-1950.0	☒		☒			
1A	127	µε = 3.58n	-1830		☒	☒		☒	☒
1A	128	µε = 3.58n	-1830		☒	☒		☒	
1A	129	µε = 3.46n	-1771.6	☒		☒		☒	
1A	130	µε = 3.46n	-1771.6			☒			
1A	131	µε = 3.58n	-1830		☒	☒		☒	
1A	132	µε = 3.58n	-1830		☒	☒		☒	☒
1A	133	µε = 3.82n	-1955.8	☒		☒		☒	
1A	134	µε = 3.82n	-1955.8	☒		☒		☒	
1A	135	µε = 3.46n	-1771.6	☒					

Chart 2 - Page 3

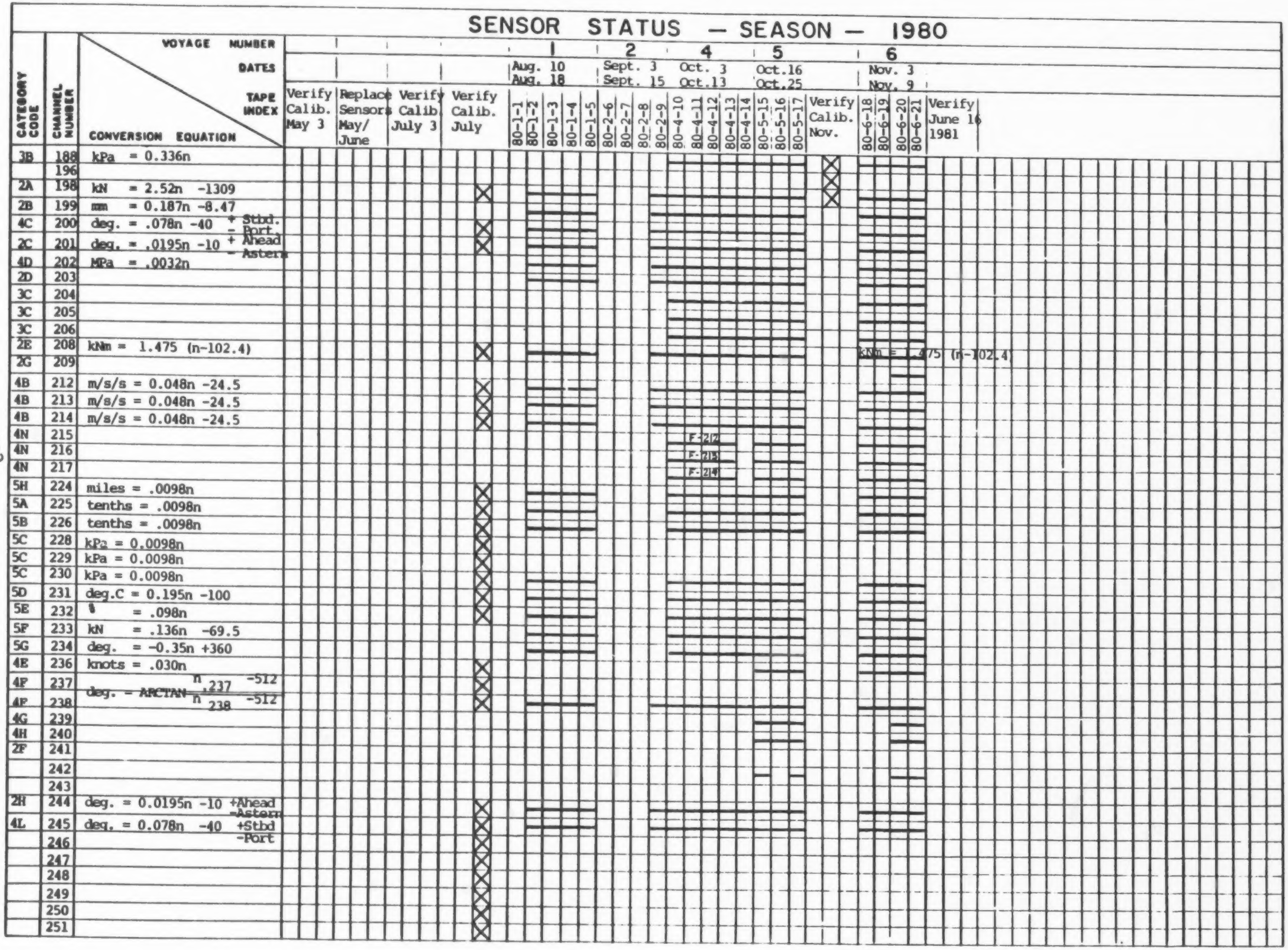
SENSOR STATUS — SEASON — 1980



CATEGORY CODE	CHANNEL NUMBER	CONVERSION EQUATION	Verify Calib. May 3	Replace Sensors May/June	Verify Calib. July 3	Verify Calib. July	Verify Calib. Nov.	Verify June 16 1981
1A	136	με = 3.58n -1830		☒	☒		☒	
1A	137	με = 3.82n -1955.8	☒		☒			
1A	138	με = 3.58n -1830		☒	☒		☒	
1A	139	με = 3.82n -1955.8	☒		☒			
1A	140	με = 3.82n -1955.8	☒		☒		☒	☒
1A	141	με = 3.80n -1950.0						
1A	142	με = 3.46n -1771.6						
1A	143	Spare						
1A	144	με = 3.46n -1771.6	☒					
1A	145	με = 3.82n -1955.8	☒		☒		☒	☒
1A	146	με = 3.46n -1771.6						
1A	147	με = 3.58n -1830		☒	☒		☒	
1A	148	με = 3.58n -1830		☒	☒		☒	
1A	149	με = 3.58n -1830		☒	☒		☒	
1A	150	με = 3.58n -1830		☒				
1A	151	με = 3.82n -1955.8						
1A	152	με = 3.58n -1830		☒	☒		☒	
1A	153	με = 3.82n -1955.8	☒		☒		☒	☒
1A	154	με = 3.46n -1771.6						
1A	155	με = 3.46n -1771.6	☒		☒		☒	
1A	156	με = 3.46n -1771.6						
1A	157	με = 3.58n -1830		☒	☒		☒	
1A	158	με = 3.58n -1830		☒	☒		☒	
1A	159	Spare						
1A	160	με = 3.58n -1830		☒	☒		☒	☒
1A	161	με = 3.58n -1830		☒	☒		☒	
1A	162	με = 3.82n -1955.8	☒		☒		☒	
1A	163	με = 3.58n -1830		☒	☒		☒	☒
1H	164	με = 3.82n -1955.8						
1H	165	με = 3.82n -1955.8						
1A	166	με = 3.82n -1955.8	☒		☒		☒	
1A	167	με = 3.82n -1955.8	☒		☒			
1A	168	με = 3.58n -1830		☒				☒
1A	169	με = 3.58n -1830		☒	☒		☒	
1A	170	με = 3.82n -1955.8	☒		☒		☒	
1A	171	Spare						
1A	172	Spare						
1H	173	με = 3.46n -1771.6						
1A	174	με = 3.46n -1771.6	☒		☒		☒	☒
1A	175							
1E	176	με = 3.58n -1830						
1E	177	με = 3.58n -1830						
1E	178	με = 3.58n -1830						
1E	179	με = 3.58n -1830						
3A	187	kPa = 0.0336n					☒	

Chart 2 - Page 4

SENSOR STATUS — SEASON — 1980



VOYAGE NUMBER: 1 | 2 | 4 | 5 | 6

DATES: Aug. 10 – Aug. 18 | Sept. 3 – Sept. 15 | Oct. 3 – Oct.13 | Oct.16 – Oct.25 | Nov. 3 – Nov. 9

TAPE INDEX: Verify Calib. May 3 | Replace Sensors May/June | Verify Calib July 3 | Verify Calib. July | 80-1-1 | 80-1-2 | 80-1-3 | 80-1-4 | 80-1-5 | 80-2-6 | 80-2-7 | 80-2-8 | 80-2-9 | 80-4-10 | 80-4-11 | 80-4-12 | 80-4-13 | 80-4-14 | 80-5-15 | 80-5-16 | 80-5-17 | Verify Calib. Nov. | 80-6-18 | 80-6-19 | 80-6-20 | 80-6-21 | Verify June 16 1981

CATEGORY CODE	CHANNEL NUMBER	CONVERSION EQUATION
3B	188	kPa = 0.336n
	196	
2A	198	kN = 2.52n -1309
2B	199	mm = 0.187n -8.47
4C	200	deg. = .078n -40 + Stbd. - Port
2C	201	deg. = .0195n -10 + Ahead - Astern
4D	202	MPa = .0032n
2D	203	
3C	204	
3C	205	
3C	206	
2E	208	kNm = 1.475 (n-102.4)
2G	209	
4B	212	m/s/s = 0.048n -24.5
4B	213	m/s/s = 0.048n -24.5
4B	214	m/s/s = 0.048n -24.5
4N	215	
4N	216	
4N	217	
5H	224	miles = .0098n
5A	225	tenths = .0098n
5B	226	tenths = .0098n
5C	228	kPa = 0.0098n
5C	229	kPa = 0.0098n
5C	230	kPa = 0.0098n
5D	231	deg.C = 0.195n -100
5E	232	% = .098n
5F	233	kN = .136n -69.5
5G	234	deg. = -0.35n +360
4E	236	knots = .030n
4F	237	deg. = ARCTAN $\frac{n_{237} - 512}{n_{238} - 512}$
4F	238	
4G	239	
4H	240	
2F	241	
	242	
	243	
2H	244	deg. = 0.0195n -10 +Ahead -Astern
4L	245	deg. = 0.078n -40 +Stbd -Port
	246	
	247	
	248	
	249	
	250	
	251	

F-212

F-213

F-214

kNm = 1.475 (n-102.4)

Chart 2 - Page 5

SENSOR STATUS — SEASON — 1980

		VOYAGE NUMBER					1					2				4					5				6				
		DATES					Aug. 10 Aug. 18					Sept. 3 Sept. 15				Oct. 3 Oct. 13					Oct.16 Oct.25				Nov. 3 Nov. 9				
CATEGORY CODE	CHANNEL NUMBER	TAPE INDEX CONVERSION EQUATION	Verify Calib. May 3	Replace Sensors May/June	Verify Calib. July 3	Verify Calib. July	80-1-1	80-1-2	80-1-3	80-1-4	80-1-5	80-2-6	80-2-7	80-2-8	80-2-9	80-4-10	80-4-11	80-4-12	80-4-13	80-4-14	80-5-15	80-5-16	80-5-17	Verify Calib. Nov.	80-6-18	80-6-19	80-6-20	80-6-21	Verify June 16 1981
4J	252	M = .003n +7.93						—	—	—	—				—	—	—	—	—	—	—	—	—		—	—	—	—	
4K	253	M = .003n +7.93						—	—	—	—				—	—	—	—	—	—	—	—	—		—	—	—	—	
	254																												
	255																				—	—	—		—	—	—	—	

Chart 2 - Page 6

SENSOR LISTING
Data Acquisition System
M.V. Arctic
1981 Season

Channel Number	PARAMETER MEASURED AND LOCATION
1	Accelerations -Heave -Forward
2	Accelerations -Sway -Forward
3	Strain - Starboard Frame 200.5
4	Strain - Starboard Frame 201.5
5	Hull Temperature
6	Hull Temperature
7	Hull Temperature
8	Hull Temperature
9	Hull Temperature
10	Hull Temperature
11	Filtered Output Channel 1
12	Filtered Output Channel 2
13	Filtered Output Channel 3
14	Strain Port Frame 181.0
15	Strain Port Plate at Stringer 4
16	Strain Port Plate at Stringer 5
17	Strain Port Plate at Stringer 4A
18	Strain Port Frame 183.0
19	Strain Port Frame 185.0
20	Strain Port Plate at Stringer 5
21	Strain Port Frame 187.0
22	Strain Port Plate at Stringer 4A
23	Strain Port Frame 189.0
24	Strain Port Plate at Stringer 5
25	Strain Port Plate at Stringer 5
26	Strain Port Frame 191.0
27	Strain Port Plate at Stringer 4A
28	Strain Port Frame 194.5
29	Strain Port Frame 195.0

TABLE 6

SENSOR LISTING

Data Acquisition System

M.V. Arctic

1981 Season

Channel Number	PARAMETER MEASURED AND LOCATION
30	Strain Port Plate at Stringer 5
31	Accelerations - Surge - Forward
32	Strain Starboard Plate at Stringer 4A
33	Strain Starboard Plate at Stringer 5
34	Strain Starboard Frame 189.5
35	Strain Starboard Frame 190.5
36	Strain Starboard Frame 191.0
37	Strain Starboard Frame 191.0
38	Strain Starboard Frame 191.0
39	Strain Starboard Frame 191.0
40	Strain Starboard Frame 191.0
41	Strain Starboard Frame 191.0
42	Strain Starboard Frame 191.0
43	Strain Starboard Plate at Stringer 3
44	Strain Starboard Plate at Stringer 4
45	Strain Starboard Plate at Stringer 4A
46	Strain Starboard Plate at Stringer 5
47	Spare Channel
48	Strain - Starboard Frame 191.5
49	Strain Starboad Frame 192.5
50	Strain Starboard Frame 192.5
51	Strain Starboard Frame 193.0
52	Strain Starboard Frame 193.0
53	Strain Starboard Frame 193.0
54	Strain Starboard Plate at Stringer 4
55	Strain Starboard Plate at Stringer 4A
56	Strain Starboard Plate at Stringer 5
57	Strain Starboard Frame 193.5
58	Strain Starboard Frame 193.5

TABLE 6

SENSOR LISTING
Data Acquisition System
M.V. Arctic
1981 Season

Channel Number	PARAMETER MEASURED AND LOCATION
59	Strain Starboard Frame 194.5
60	Strain Starboard Frame 194.5
61	Spare Channel
62	Strain Starboard Frame 195.0
63	Strain Starboard Frame 195.0
64	Strain Starboard Frame 195.0
65	Strain Starboard Frame 195.0
66	Strain Starboard Plate at Stringer 4A
67	Strain Starboard Plate at Stringer 5
68	Strain Starboard Frame 195.5
69	Strain Starboard Frame 195.5
70	Strain Starboard Frame 196.5
71	Strain Starboard Frame 197.0
72	Strain Starboard Frame 197.0
73	Strain Starboard Frame 197.0
74	Strain Starboard Plate at Stringer 4A
75	Strain Starboard Plate at Stringer 5
76	Strain Starboard Frame 197.5
77	Strain Starboard Frame 198.5
78	Strain Starboard Frame 199.0
79	Strain Starboard Frame 199.5
80	Strain Starboard Plate at Stringer 4A
81	Strain Starboard Plate at Stringer 4A
82	Filtered Ouput Channel 81
83	Filtered Output Channel 98
84	Strain Starboard Plate at Stringer 5
85	Strain Starboard Frame 183.5
86	Strain Starboard Frame 184.5
87	Strain Starboard Frame 185.0

TABLE 6

SENSOR LISTING

Data Acquisition System

M.V. Arctic

1981 Season

Channel Number	PARAMETER MEASURED AND LOCATION
88	Strain Starboard Frame 185.0
89	Strain Starboard Frame 185.0
90	Strain Starboard Frame 185.0
91	Strain Starboard Frame 185.0
92	Filtered Output Channel 90
93	Strain Starboard Plate at Stringer 3
94	Strain Starboard Plate at Stringer 4
95	Strain Starboard Plate at Stringer 4A
96	Strain Starboard Plate at Stringer 4A
97	Strain Starboard Plate at Stringer 4A
98	Strain Starboard Plate at Stringer 4A
99	Strain Starboard Plate at Stringer 5
100	Strain Starboard Frame 185.5
101	Strain Inner Skin at Stringer 5
102	Strain Inner Skin at Stringer 5
103	Strain Inner Skin at Stringer 5
104	Strain Inner Skin at Stringer 5
105	Strain Web Frame 184.0
106	Strain Web Frame 184.0
107	Strain Web Frame 184.0
108	Strain Web Frame 184.0
109	Strain Starboard Frame 186.5
110	Strain Starboard Frame 186.5
111	Strain Starboard Frame 187.0
112	Strain Starboard Frame 187.0
113	Strain Starboard Frame 187.0
114	Strain Starboard Frame 187.0
115	Strain Starboard Plate at Stringer 4
116	Strain Starboard Plate at Stringer 4A

TABLE 6

SENSOR LISTING

Data Acquisition System

M.V. Arctic

1981 Season

Channel Number	PARAMETER MEASURED AND LOCATION
117	Strain Starboard Plate at Stringer 5
118	Strain Starboard Frame 187.5
119	Strain Starboard Frame 188.5
120	Strain Starboard Frame 189.0
121	Strain Starboard Frame 189.0
122	Strain Starboard Frame 189.0
123	Filtered Output Channel 102 or 110
124	Filtered Output Channel 103 or 116
125	3 Filtered Output Channel 104 or 118
126	Strain Starboard Plate at Stringer 4
127	Spare Channel
128	Strain Starboard Frame 178.5
129	Strain Starboard Frame 179.0
130	Strain Starboard Frame 179.0
131	Strain Starboard Frame 179.0
132	Strain Starboard Frame 179.0
133	Strain Starboard Frame 179.0
134	Strain Starboard Frame 179.0
135	Strain Starboard Plate at Stringer 3
136	Strain Starboard Plate at Stringer 4
137	Strain Starboard Plate at Stringer 4A
138	Strain Starboard Plate at Stringer 5
139	Strain Starboard Frame 179.5
140	Strain Starboard Frame 180.5
141	Strain Starboard Frame 181.0
142	Strain Starboard Frame 181.0

TABLE 6

SENSOR LISTING

Data Acquisition System

M.V. Arctic

1981 Season

Channel Number	PARAMETER MEASURED AND LOCATION
143	Filtered Output Channel 132
144	Strain Starboard Frame 181.0
145	Strain Starboard Frame 181.0
146	Strain Starboard Plate at Stringer 3
147	Strain Starboard Plate at Stringer 4
148	Strain Starboard Plate at Stringer 4A
149	Strain Starboard Plate at Stringer 5
150	Filtered Output Channel 130, 131 or 137
151	Strain Starboard Frame 181.0
152	Strain Starboard Frame 181.5
153	Strain Starboard Frame 182.5
154	Strain Starboard Frame 183.0
155	Strain Starboard Frame 183.0
156	Strain Starboard Frame 183.0
157	Strain Starboard Frame 183.0
158	Strain Starboard Frame 183.0
159	Spare Channel
160	Strain Starboard Frame 183.0
161	Strain Starboard Frame 183.0
162	Strain Starboard Frame 183.0
163	Strain Starboard Frame 183.0
164	Filtered Output Channel 131, 132, 139 or 142
165	Filtered Output Channel 132, 140 or 144
166	Strain Starboard Frame 183.0
167	Strain Starboard Plate at Stringer 5
168	Filtered Output Channel 137 or 145
169	Strain Starboard Plate at Stringer 5
170	Strain Starboard Plate at Stringer 5
171	Filtered Output Channel 132, 133, 145 , 147 or 148

TABLE 6

SENSOR LISTING
Data Acquisition System
M.V. Arctic
1981 Season

Channel Number	PARAMETER MEASURED AND LOCATION
172	Filtered Output Channel 142, 146, 148 or 153
173	Filtered Output Channel 145, 147, 156 or 158
174	Filtered Output Channel 148, 155 or 160
175	Filtered Output Channel 156
176	Strain Starboard Frame 103A
177	Strain Starboard Frame 104A
178	Strain Starboard Frame 105A
179	Strain Starboard Plate at Stringer C
180	Strain Starboard Plate at Stringer C
181	Strain Starboard Plate at Stringer C
182	Strain Starboard Plate at Stringer C
183	Strain Starboard Plate at Stringer C
184	Strain Starboard Frame 106A
185	Strain Starboard Frame 107A
186	Spare Channel
187	Bubbler Pressure
188	Bubbler Pressure
198	Shaft Thrust
199	Fuel Rack Position
200	Rudder Angle Response
201	Propeller Pitch Response
202	Differential Pressure - Rudder
203	Differential Pressure - Rudder Propeller Pitch
204	Bubbler Valve Status
205	Bubbler Valve Status
206	Bubbler Valve Status
207	Spare Channel
208	Shaft Torque
209	Spare Channel

TABLE 6

SENSOR LISTING
Data Acquisition System
M.V. Arctic
1981 Season

Channel Number	PARAMETER MEASURED AND LOCATION
210	Spare Channel
211	Spare Channel
212	Acceleration - Surge - Aft
213	Acceleration - Sway - Aft
214	Acceleration - Heave - Aft
215	Spare Channel
216	Spare Channel
217	Spare Channel
224	Visibility
225	Cloud Cover
226	Ice Cover
227	Spare Channel
228	Barometric Pressure (0 to 0.9 kPa)
229	Barometric Pressure (1 to 9 kPa)
230	Barometric Pressure (90 or 100 kPa)
231	Air Temperature
232	Rel. Humidity
233	Wind Speed
234	Wind Direction
235	Spare Channel
236	Ship Speed
237	Sine Ships Heading
238	Cosine Ships Heading
239	Pitch Angle
240	Roll Angle
241	Engine RPM
242	Shaft RPM
243	Space Channel
244	Propeller Pitch Command

TABLE 6

SENSOR LISTING
Data Acquisition System
M.V. Arctic
1981 Season

Channel Number	PARAMETER MEASURED AND LOCATION
245	Rudder Angle Command
246	Spare Channel
247	Spare Channel
248	Spare Channel
249	Spare Channel
250	Spare Channel
251	Spare Channel
252	Ships Draught - Forward
253	Ships Draught - Aft
254	Spare Channel
255	Event Marker

TABLE 6

SENSOR STATUS — SEASON — 1981 — EARLY

		VOYAGE NUMBER							1			2		
		DATES							June26 Jul.9			Jul.12 Jul.22		
CATEGORY CODE	CHANNEL NUMBER	CONVERSION EQUATION		TAPE INDEX	Verify June 16	Replaced Sensor June	Verify & Calib. June 25	Verify & Calib. July 3	81-1-1	81-1-7	81-1-8	81-2-9	81-2-10	81-2-11	Verify Aug. 4
4A	1	m/s/s	= .048n	-24.5			X		—		—	—	—	—	
4A	2	m/s/s	= .048n	-24.5			X		—		—	—	—	—	
1A	3	με	= 3.82n	-1955.8											
1A	4	με	= 3.82n	-1955.8											
	5														
	6														
	7														
	8														
	9														
	10														
4H	11	με	= 3.72n	-1904.6							—	—	—		
4H	12	με	= 3.72n	-1904.6							—	—	—		
4H	13	με	= 3.72n	-1904.6							—	—	—		
1B	14	με	= 3.72n	-1904.6											
1B	15	με	= 3.80n	-1950.0											
1B	16	με	= 3.72n	-1904.6											
1B	17	με	= 3.72n	-1904.6											
1B	18	με	= 3.80n	-1950.0					—						
1B	19	με	= 3.72n	-1904.6	X		X		—		—	—	—	—	
1B	20	με	= 3.80n	-1950.0	X		X		—		—	—	—	—	
1B	21	με	= 3.72n	-1904.6	X		X								
1B	22	με	= 3.72n	-1904.6											
1B	23	με	= 3.80n	-1950.0											
1B	24	με	= 3.80n	-1950.0											
1B	25	με	= 3.80n	-1950.0											
1B	26	με	= 3.80n	-1950.0	X		X								
1B	27	με	= 3.80n	-1950.0											
1B	28	με	= 3.80n	-1950.0					—		—	—	—	—	
1B	29	με	= 3.80n	-1950.0											
1B	30	με	= 3.80n	-1950.0											
4A	31	m/s/s	= .048n	-24.5			X		—		—	—	—	—	
1A	32	με	= 3.58n	-1830.0			X								
1A	33	με	= 3.80n	-1950.0		X	X	X	—	—	—	—	—	—	X
1A	34	με	= 3.46n	-1771.6			X	X	—	—	—	—	—	—	X
1A	35	με	= 3.46n	-1771.6			X								
1A	36	με	= 3.80n	-1950.0		X	X	X	—	—	—	—	—	—	X
1A	37	με	= 3.80n	-1950.0		X	X								
1A	38	με	= 3.72n	-1904.6			X	X	—	—	—	—	—	—	X
1A	39	με	= 3.80n	-1950.0	X		X	X	—	—	—	—	—	—	X
1A	40	με	= 3.80n	-1950.0	X		X	X	—	—	—	—	—	—	X
1A	41	με	= 3.82n	-1155.8	X		X	X	—	—	—	—	—	—	X
1A	42	με	= 3.82n	-1155.8	X		X	X	—	—	—	—	—	—	X
1A	43	με	= 3.46n	-1771.6	X		X	X	—	—	—	—	—	—	X
1A	44	με	= 3.58n	-1830.0	X		X	X	—	—	—	—	—	—	X
1A	45	με	= 3.58n	-1830.0	X		X	X	—	—	—	—	—	—	X

Chart No. 3 - Page 1

SENSOR STATUS — SEASON — 1981 — EARLY

		VOYAGE NUMBER					1			2			
		DATES					June26 July 9			Jul.12 Jul.22			
CATEGORY CODE	CHANNEL NUMBER	CONVERSION EQUATION / TAPE INDEX	Verify June16	Repla-ced Sensors June	Verify & Calib June25	Verify & Calib. July 3	81-1-1	81-1-7	81-1-8	81-2-9	81-2-10	81-2-11	Verify Aug.4
1A	46	με = 3.80n -1950.0		☒	☒	☒	—	—	—	—	—	—	☒
1A	47												
1A	48	με = 3.46n -1771.6	☒		☒								
1A	49	με = 3.58n -1830.0											
1A	50	με = 3.58n -1830.0	☒		☒	☒	—	—	—	—	—	—	☒
1A	51	με = 3.80n -1950.0		☒	☒	☒	—	—	—	—	—	—	☒
1A	52	με = 3.80n -1950.0											
1A	53	με = 3.80n -1950.0	☒		☒	☒	—	—	—	—	—	—	☒
1A	54	με = 3.80n -1950.0		☒	☒	☒	—	—	—	—	—	—	☒
1A	55	με = 3.80n -1950.0		☒	☒	☒	—	—	—	—	—	—	☒
1A	56	με = 3.80n -1950.0		☒	☒	☒	—	—	—	—	—	—	☒
1A	57	με = 3.58n -1830.0			☒	☒	—	—	—	—	—	—	
1A	58	με = 3.58n -1830.0	☒		☒								
1A	59	με = 3.58n -1830.0	☒		☒	☒	—	—	—	—	—	—	☒
1A	60												
1A	61												
1A	62												
1A	63	με = 3.80n -1950.0	☒		☒	☒	—	—	—	—	—	—	☒
1A	64	με = 3.82n -1955.8											
1A	65	με = 3.82n -1955.8											
1A	66	με = 3.58n -1830.0	☒		☒	☒	—	—	—	—	—	—	☒
1A	67	με = 3.58n -1830.0	☒		☒	☒	—	—	—	—	—	—	☒
1A	68	με = 3.58n -1830.0	☒		☒								
1A	69	με = 3.58n -1830.0	☒		☒	☒	—	—	—	—	—	—	☒
1A	70	με = 3.58n -1830.0	☒		☒	☒	—	—	—	—	—	—	☒
1A	71	με = 3.72n -1904.6	☒		☒	☒	—	—	—	—	—	—	☒
1A	72	με = 3.80n -1950.0	☒		☒	☒	—	—	—	—	—	—	☒
1A	73	με = 3.80n -1950.0	☒		☒	☒	—	—	—	—	—	—	☒
1A	74	με = 3.80n -1950.0		☒	☒	☒	—	—	—	—	—	—	☒
1A	75	με = 3.80n -1950.0			☒	☒	—	—	—	—	—	—	☒
1A	76	με = 3.80n -1950.0											
1A	77												
1A	78	με = 3.80n -1950.0	☒		☒								
1A	79	με = 3.82n -1955.8											
1A	80	με = 3.58n -1830.0											
1A	81	με = 3.80n -1950.0		☒	☒	☒	—	—	—	—	—	—	☒
1H	82	με = 3.58n -1830.0								—	—	—	
1H	83	με = 3.58n -1830.0											
1A	84	με = 3.58n -1830.0		☒	☒	☒	—	—	—	—	—	—	
1A	85	με = 3.82n -1955.8	☒		☒	☒	—	—	—	—	—	—	☒
1A	86	με = 3.58n -1830.0											
1A	87												
1A	88	με = 3.80n -1950.0		☒	☒	☒	—	—	—	—	—	—	☒
1A	89	με = 3.57n -1830.0	☒		☒	☒	—	—	—	—	—	—	☒
1A	90	με = 3.82n -1955.8	☒		☒	☒	—	—	—	—	—	—	☒

Chart No. 3 - Page 2

SENSOR STATUS — SEASON — 1981 — EARLY

CATEGORY CODE	CHANNEL NUMBER	VOYAGE NUMBER					1			2			
		DATES					June26 July 9			Jul.12 Jul.22			
		CONVERSION EQUATION / TAPE INDEX	Verify June16	Replaced Sensors June	Verify & Calib. June25	Verify & Calib. July 3	81-1-1	81-1-7	81-1-8	81-2-9	81-2-10	81-2-11	Verify Aug.4
1A	91	με = 3.58n -1830.0	X		X	X	—	—	—	—	—	—	X
1H	92												
1A	93	με = 3.80n -1950.0		X	X	X	—	—	—	—	—	—	X
1A	94	με = 3.80n -1950.0		X	X	X	—	—	—	—	—	—	X
1A	95	με = 3.58n -1830.0	X		X	X	—	—	—	—	—	—	X
1A	96												
1D	97	με = 3.80n -1950.0		X	X	X	—	—	—	—	—	—	X
1D	98	με = 3.80n -1950.0		X	X	X	—	—	—	—	—	—	X
1A	99	με = 3.80n -1950.0		X	X	X	—	—	—	—	—	—	X
1D	100	με = 3.80n -1950.0		X	X	X	—	—	—	—	—	—	X
1D	101	με = 3.80n -1950.0		X	X	X	—	—	—	—	—	—	X
1D	102	με = 3.80n -1950.0		X	X	X	—	—	—	—	—	—	X
1D	103	με = 3.80n -1950.0		/	X	X	—	—	—	—	—	—	X
1D	104	με = 3.80n -1950.0		/	X	X	—	—	—	—	—	—	X
1A	105	με = 3.58n -1830.0	X		X	X	—	—	—	—	—	—	X
1A	106	με = 3.82n -1955.8	X		X	X	—	—	—	—	—	—	X
1A	107												
1A	108	με = 3.82n -1955.8											
1A	109	με = 3.80n -1950.0		X									
1A	110	με = 3.58n -1830.0	X		X	X	—	—	—	—	—	—	X
1A	111	με = 3.80n -1950.0		X	X	X	—	—	—	—	—	—	X
1D	112	με = 3.80n -1950.0		X	X	X	—	—	—	—	—	—	X
1A	113	με = 3.80n -1950.0		X	X	X	—	—	—	—	—	—	X
1D	114	με = 3.80n -1950.0		X	X	X	—	—	—	—	—	—	X
1A	115	με = 3.80n -1950.0		X	X	X	—	—	—	—	—	—	X
1A	116	με = 3.80n -1950.0		X	X	X	—	—	—	—	—	—	X
1A	117	με = 3.80n -1950.0		X	X	X	—	—	—	—	—	—	X
1A	118	με = 3.82n -1955.8	X		X	X	—	—	—	—	—	—	X
1A	119												
1A	120	με = 3.58n -1830.0	X		X	X	—	—	—	—	—	—	X
1A	121	με = 3.58n -1830.0	X		X	X	—	—	—	—	—	—	X
1A	122	με = 3.80n -1950.0		X	X	X	—	—	—	—	—	—	X
1H	123												
1H	124												
1H	125	με = 3.80n -1950.0		X	X								
1A	126	με = 3.80n -1950.0		X	X	X	—	—	—	—	—	—	X
1A	127	με = 3.58n -1830.0	X		X	X	—	—	—	—	—	—	
1A	128	με = 3.58n -1830.0			X								
1D	129	με = 3.80n -1950.0		X	X	X	—	—	—	—	—	—	X
1A	130	με = 3.80n -1950.0		X	X		—	—	—	—	—	—	X
1A	131	με = 3.58n -1830.0			X	X	—	—	—	—	—	—	X
1A	132	με = 3.58n -1830.0	X		X	X	—	—	—	—	—	—	X
1A	133	με = 3.80n -1950.0		X	X	X	—	—	—	—	—	—	X
1D	134	με = 3.80n -1950.0		X	X	X	—	—	—	—	—	—	X
1A	135	με = 3.80n -1950.0		X	X	X	—	—	—	—	—	—	

Chart No. 3 - Page 3

SENSOR STATUS — SEASON — 1981 — EARLY

CATEGORY CODE	CHANNEL NUMBER	CONVERSION EQUATION (VOYAGE NUMBER / DATES / TAPE INDEX)	Verify June16	Replaced Sensors June	Verify & Calib. June25	Verify & Calib. July3	81-1-1	81-1-7	81-1-8	81-2-9	81-2-10	81-2-11	Verify Aug.4
		VOYAGE NUMBER					1			2			
		DATES					June26 July 9			Jul.12 Jul.22			
1A	136	με = 3.80n -1950.0		X	X	X							X
1A	137	με = 3.80n -1950.0		X	X	X							X
1A	138	με = 3.80n -1950.0		X	X	X							
1D	139	με = 3.80n -1950.0		X	X	X							X
1A	140	με = 3.82n -1955.8	X		X								
1D	141	με = 3.80n -1950.0		X	X	X							X
1A	142	με = 3.80n -1950.0		X	X	X							X
1H	143	με = 3.80n -1950.0		X	X					132			
1A	144	με = 3.80n -1950.0		X	X	X							X
1A	145	με = 3.82n -1955.8	X		X	X							X
1A	146	με = 3.80n -1950.0		X	X	X							X
1A	147	με = 3.80n -1950.0		X	X	X							X
1A	148	με = 3.80n -1950.0		X	X	X							X
1A	149	με = 3.80n -1950.0		X	X	X							X
1H	150	με = 3.80n -1950.0		X	X					137			
1D	151	με = 3.80n -1950.0		X	X	X							X
1D	152	με = 3.80n -1950.0		X	X	X							X
1A	153	με = 3.82n -1955.8	X		X	X							X
1D	154	με = 3.80n -1950.0		X	X	X							
1A	155	με = 3.46n -1771.6			X	X							X
1A	156	με = 3.80n -1950.0		X	X	X							X
1D	157	με = 3.80n -1950.0		X	X	X							X
1A	158	με = 3.58n -1830.0	X										
1D	159	με = 3.80n -1950.0		X	X	X							X
1A	160	με = 3.58n -1830.0	X										X
1D	161	με = 3.80n -1950.0		X	X	X							X
1D	162	με = 3.80n -1950.0		X	X	X							X
1A	163	με = 3.58n -1830.0	X		X	X							X
1H	164							131		132			
1H	165								132		140		
1D	166			X	X	X							X
1D	167	με = 3.80n -1950.0		X	X	X							X
1H	168		X						[illegible]	[illegible]			
1D	169	με = 3.80n -1950.0		X	X	X							X
1D	170	με = 3.80n -1950.0		X	X	X							X
1H	171								[illegible]	[illegible]			
1H	172	με = 3.80n -1950.0		X	X				[illegible]	[illegible]			
1H	173	με = 3.80n -1950.0		X	X				[illegible]	[illegible]			
1H	174	με = 3.46n -1771.6	X		X					160			
1H	175												
1E	176	με = 3.58n -1830											
1E	177	με = 3.58n -1830											
1E	178	με = 3.58n -1830											
1E	179	με = 3.58n -1830											
	180												

Chart No. 3 - Page 4

SENSOR STATUS – SEASON – 1981 – EARLY

CATEGORY CODE	CHANNEL NUMBER	VOYAGE NUMBER / DATES / TAPE INDEX / CONVERSION EQUATION	Verify June16	Replaced Sensors June	Verify & Calib. June25	Verify & Calib. July 3	1			2			Verify Aug. 4
		DATES					June26 July 9			Jul.12 Jul.22			
		TAPE INDEX					81-1-1	81-1-7	81-1-8	81-2-9	81-2-10	81-2-11	
3A	187	kPa =0.0336n											
3B	188	kPa = 0.0336n											
	196												
2A	198	kN = 2.29n 1177.2			X		—	—	—	—	—	—	
2B	199	mm = 0.187n -8.47					—	—	—	—	—	—	
4C	200	deg. = .078n -40 +Stbd. – Port			X		—	—	—	—	—	—	
2C	201	deg. = .037n -19.25 +Ahead -Astern			X		—	—	—	—	—	—	
4D	202								—	—	—	—	
2D	203								—	—	—	—	
2E	208	kNm = 1.475 (n-102.4)			X		—	—	—	—	—	—	
2G	209						—	—	—	—	—	—	
	211						—	—	—	—	—	—	
4B	212	m/s/s = .048n -24.5			X		—	—	—	—	—	—	
4B	213	m/s/s = .048n -24.5			X		—	—	—	—	—	—	
2B	214	m/s/s = .048n -24.5			X		—	—	—	—	—	—	
	215							—	—				
	216							—	—				
	217							—	—				
5H	224	miles = 0.0098n			X								
5A	225	tenths = 0.0098n			X								
5B	226	tenths = 0.0098n			X								
5C	228	kPa = 0.0098n			X								
5C	229	kPa = 0.0098n			X								
5C	230	kPa 0 = < 7.15 =1 = > 7.15			X								
5D	231	deg. C = 0.195n -111.5			X								
5E	232	% = .098n			X								
5F	233	kN = .139n - 7142			X		—	—	—	—	—	—	
5G	234	deg. = 0.35n + 360					—	—	—	—	—	—	
	235												
4E	236	knots = .030n			X		—	—	—	—	—	—	
4F	237	deg. = ARCTAN $\frac{n_{237}-512}{n_{238}-512}$			X		—	—	—	—	—	—	
4F	238				/		—	—	—	—	—	—	
4G	239	deg. = n/51.2 -10			/		—	—	—	—	—	—	
4H	240	deg. = n/51.2 -10			X		—	—	—	—	—	—	
2F	241												
	242												
	243												
2H	244	deg. = 0.0195n -10 +Ahead -Astern			X		—	—	—	—	—	—	
4L	245	deg. = 0.090n -46.25 +Stbd. -Port			X		—	—	—	—	—	—	
4J	252	M =.0024 or + 9.5			X		—	—	—	—	—	—	
4K	253	M = .0024n +9.5			X		—	—	—	—	—	—	
	255												

Chart No. 3 Page 5

SENSOR STATUS — SEASON — 1981 — LATE

CATEGORY CODE	CHANNEL NUMBER	CONVERSION EQUATION			Verify Sept.1	Verify Nov.12
4A	1	m/s/s	= .048n	-24.5		
4A	2	m/s/s	= .048n	-24.5		
1A	3	με	= 3.82n	-1955.8		
1A	4	με	= 3.82n	-1955.8		
	5					
	6					
	7					
	8					
	9					
	10					
4H	11	με	= 3.72n	-1904.6		
4H	12	με	= 3.72n	-1904.6		
4H	13	με	= 3.72n	-1904.6		
1B	14	με	= 3.72n	-1904.6		
1B	15	με	= 3.80n	-1950.0		
1B	16	με	= 3.72n	-1904.6		
1B	17	με	= 3.72n	-1904.6		
1B	18	με	= 3.80n	-1950.0		
1B	19	με	= 3.72n	-1904.6		
1B	20	με	= 3.80n	-1950.0		
1B	21	με	= 3.72n	-1904.6		
1B	22	με	= 3.72n	-1904.6		
1B	23	με	= 3.80n	-1950.0		
1B	24	με	= 3.80n	-1950.0		
1B	25	με	= 3.80n	-1950.0		
1B	26	με	= 3.80n	-1950.0		
1B	27	με	= 3.80n	-1950.0		
1B	28	με	= 3.80n	-1950.0		
1B	29	με	= 3.80n	-1950.0		
1B	30	με	= 3.80n	-1950.0		
4A	31	m/s/s	= .048n	-24.5		
1A	32	με	= 3.58n	-1830.0		
1A	33	με	= 3.80n	-1950.0	☒	
1A	34	με	= 3.46n	-1771.6	☒	☒
1A	35	με	= 3.46n	-1771.6		☒
1A	36	με	= 3.80n	-1950.0	☒	☒
1A	37	με	= 3.80n	-1950.0		
1A	38	με	= 3.72n	-1904.6	☒	☒
1A	39	με	= 3.80n	-1950.0	☒	☒
1A	40	με	= 3.80n	-1950.0	☒	☒
1A	41	με	= 3.82n	-1155.8	☒	☒
1A	42	με	= 3.82n	-1155.8	☒	☒
1A	43	με	= 3.46n	-1771.6	☒	☒
1A	44	με	= 3.58n	-1830.0	☒	
1A	45	με	= 3.58n	-1830.0	☒	☒

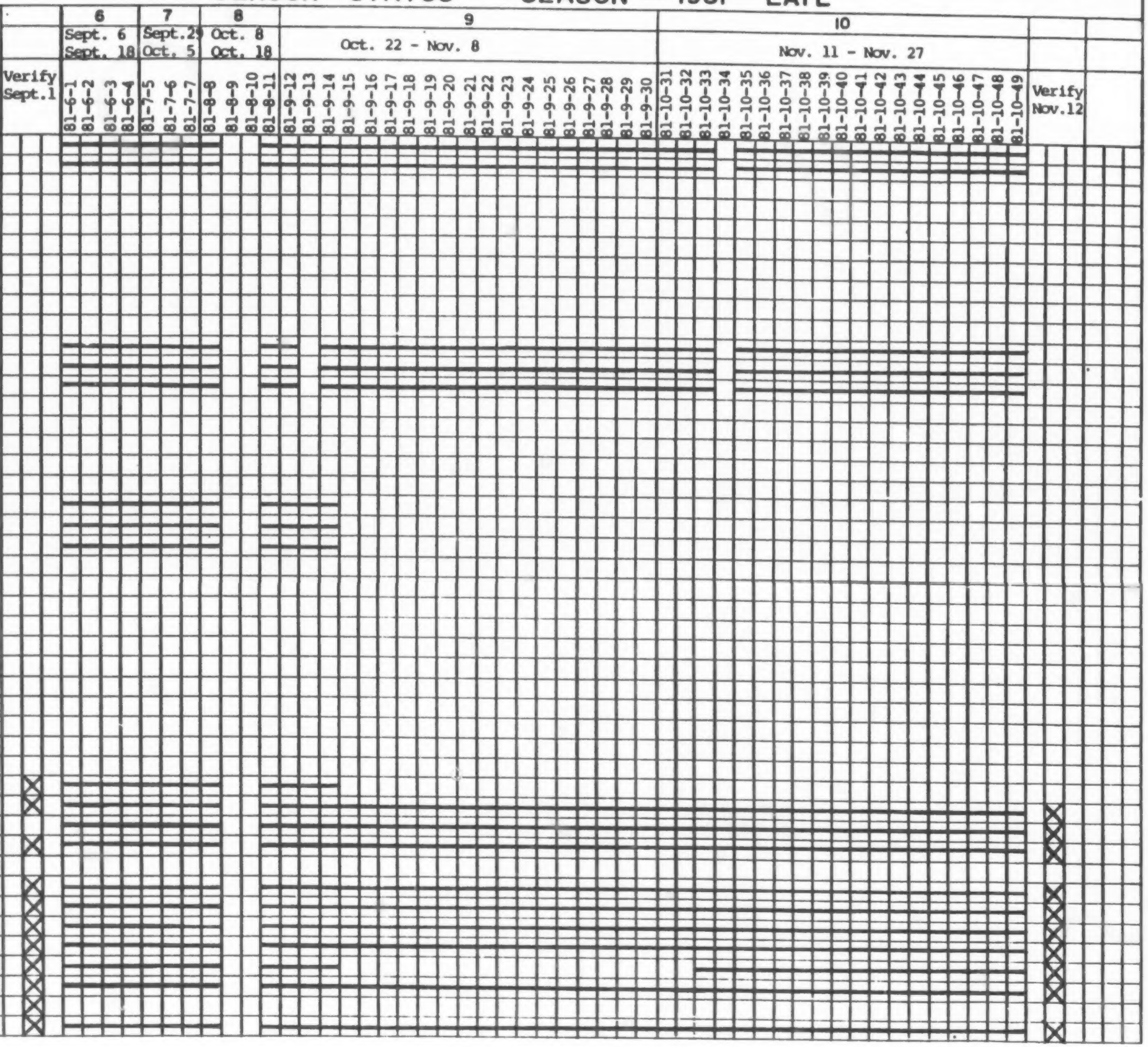


Chart No. 4 - Page 1

SENSOR STATUS — SEASON — 1981 — LATE

CATEGORY CODE	CHANNEL NUMBER	CONVERSION EQUATION	Verify Sept.1	Verify Nov.12
1A	46	με = 3.80n -1950.0	☒	
1A	47			
1A	48	με = 3.46n -1771.6		
1A	49	με = 3.58n -1830.0		☒
1A	50	με = 3.58n -1830.0	☒	☒
1A	51	με = 3.80n -1950.0	☒	☒
1A	52	με = 3.80n -1950.0		☒
1A	53	με = 3.80n -1950.0	☒	☒
1A	54	με = 3.80n -1950.0	☒	☒
1A	55	με = 3.80n -1950.0	☒	☒
1A	56	με = 3.80n -1950.0	☒	☒
1A	57	με = 3.58n -1830.0		☒
1A	58	με = 3.58n -1830.0		☒
1A	59	με = 3.58n -1830.0	☒	☒
1A	60			
1A	61			
1A	62			
1A	63	με = 3.80n -1950.0	☒	☒
1A	64	με = 3.82n -1955.8		☒
1A	65	με = 3.82n -1955.8		☒
1A	66	με = 3.58n -1830.0	☒	☒
1A	67	με = 3.58n -1830.0	☒	☒
1A	68	με = 3.58n -1830.0		
1A	69	με = 3.58n -1830.0		
1A	70	με = 3.58n -1830.0	☒	☒
1A	71	με = 3.72n -1904.6		
1A	72	με = 3.80n -1950.0	☒	☒
1A	73	με = 3.80n -1950.0	☒	☒
1A	74	με = 3.80n -1950.0	☒	☒
1A	75	με = 3.80n -1950.0	☒	☒
1A	76	με = 3.80n -1950.0		☒
1A	77			
1A	78	με = 3.80n -1950.0		
1A	79	με = 3.82n -1955.8		☒
1A	80	με = 3.58n -1830.0		☒
1A	81	με = 3.80n -1950.0	☒	☒
1H	82	με = 3.58n -1830.0		
1H	83	με = 3.58n -1830.0		
1A	84	με = 3.58n -1830.0		
1A	85	με = 3.62n -1955.8	☒	
1A	86	με = 3.58n -1830.0		☒
1A	87			
1A	88	με = 3.80n -1950.0	☒	
1A	89	με = 3.57n -1830.0	☒	☒
1A	90	με = 3.82n -1955.8	☒	

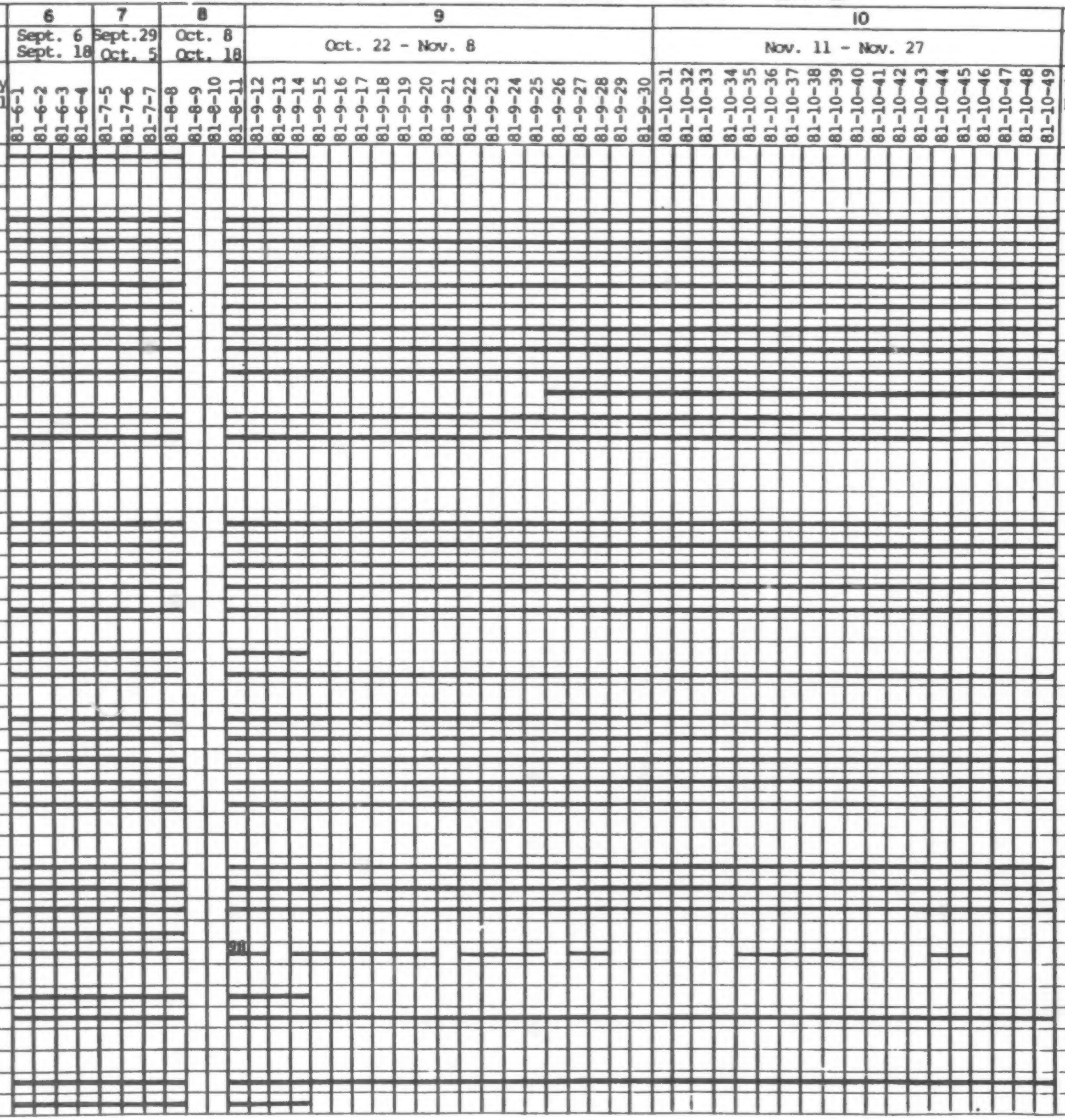


Chart No. 4 - Page 2

SENSOR STATUS -- SEASON — 1981 — LATE

CATEGORY CODE	CHANNEL NUMBER	VOYAGE NUMBER / DATES / TAPE INDEX CONVERSION EQUATION	Verify Sept.1	Verify Nov.12
1A	91	$\mu\epsilon = 3.58n \quad -1830.0$	☒	☒
1H	92			
1A	93	$\mu\epsilon = 3.80n \quad -1950.0$	☒	☒
1A	94	$\mu\epsilon = 3.80n \quad -1950.0$	☒	
1A	95	$\mu\epsilon = 3.58n \quad -1830.0$	☒	☒
1A	96			
1D	97	$\mu\epsilon = 3.80n \quad -1950.0$	☒	☒
1D	98	$\mu\epsilon = 3.80n \quad -1950.0$	☒	☒
1A	99	$\mu\epsilon = 3.80n \quad -1950.0$	☒	
1D	100	$\mu\epsilon = 3.80n \quad -1950.0$		
1D	101	$\mu\epsilon = 3.80n \quad -1950.0$	☒	☒
1D	102	$\mu\epsilon = 3.80n \quad -1950.0$	☒	☒
1D	103	$\mu\epsilon = 3.80n \quad -1950.0$	☒	☒
1D	104	$\mu\epsilon = 3.80n \quad -1950.0$	☒	☒
1A	105	$\mu\epsilon = 3.58n \quad -1830.0$	☒	☒
1A	106	$\mu\epsilon = 3.82n \quad -1955.8$	☒	☒
1A	107			
1A	108	$\mu\epsilon = 3.82n \quad -1955.8$		☒
1A	109	$\mu\epsilon = 3.80n \quad -1950.0$		
1A	110	$\mu\epsilon = 3.58n \quad -1830.0$	☒	☒
1A	111	$\mu\epsilon = 3.80n \quad -1950.0$	☒	☒
1D	112	$\mu\epsilon = 3.80n \quad -1950.0$	☒	☒
1A	113	$\mu\epsilon = 3.80n \quad -1950.0$	☒	☒
1D	114	$\mu\epsilon = 3.80n \quad -1950.0$	☒	
1A	115	$\mu\epsilon = 3.80n \quad -1950.0$	☒	
1A	116	$\mu\epsilon = 3.80n \quad -1950.0$	☒	☒
1A	117	$\mu\epsilon = 3.80n \quad -1950.0$	☒	☒
1A	118	$\mu\epsilon = 3.82n \quad -1955.8$	☒	☒
1A	119			
1A	120	$\mu\epsilon = 3.58n \quad -1830.0$	☒	☒
1A	121	$\mu\epsilon = 3.58n \quad -1830.0$	☒	
1A	122	$\mu\epsilon = 3.80n \quad -1950.0$	☒	
1H	123			
1H	124			
1H	125	$\mu\epsilon = 3.80n \quad -1950.0$		
1A	126	$\mu\epsilon = 3.80n \quad -1950.0$	☒	☒
1A	127	$\mu\epsilon = 3.58n \quad -1830.0$		
1A	128	$\mu\epsilon = 3.58n \quad -1830.0$		☒
1D	129	$\mu\epsilon = 3.80n \quad -1950.0$		
1A	130	$\mu\epsilon = 3.80n \quad -1950.0$	☒	☒
1A	131	$\mu\epsilon = 3.58n \quad -1830.0$	☒	☒
1A	132	$\mu\epsilon = 3.58n \quad -1830.0$	☒	☒
1A	133	$\mu\epsilon = 3.80n \quad -1950.0$	☒	☒
1D	134	$\mu\epsilon = 3.80n \quad -1950.0$	☒	☒
1A	135	$\mu\epsilon = 3.80n \quad -1950.0$		☒

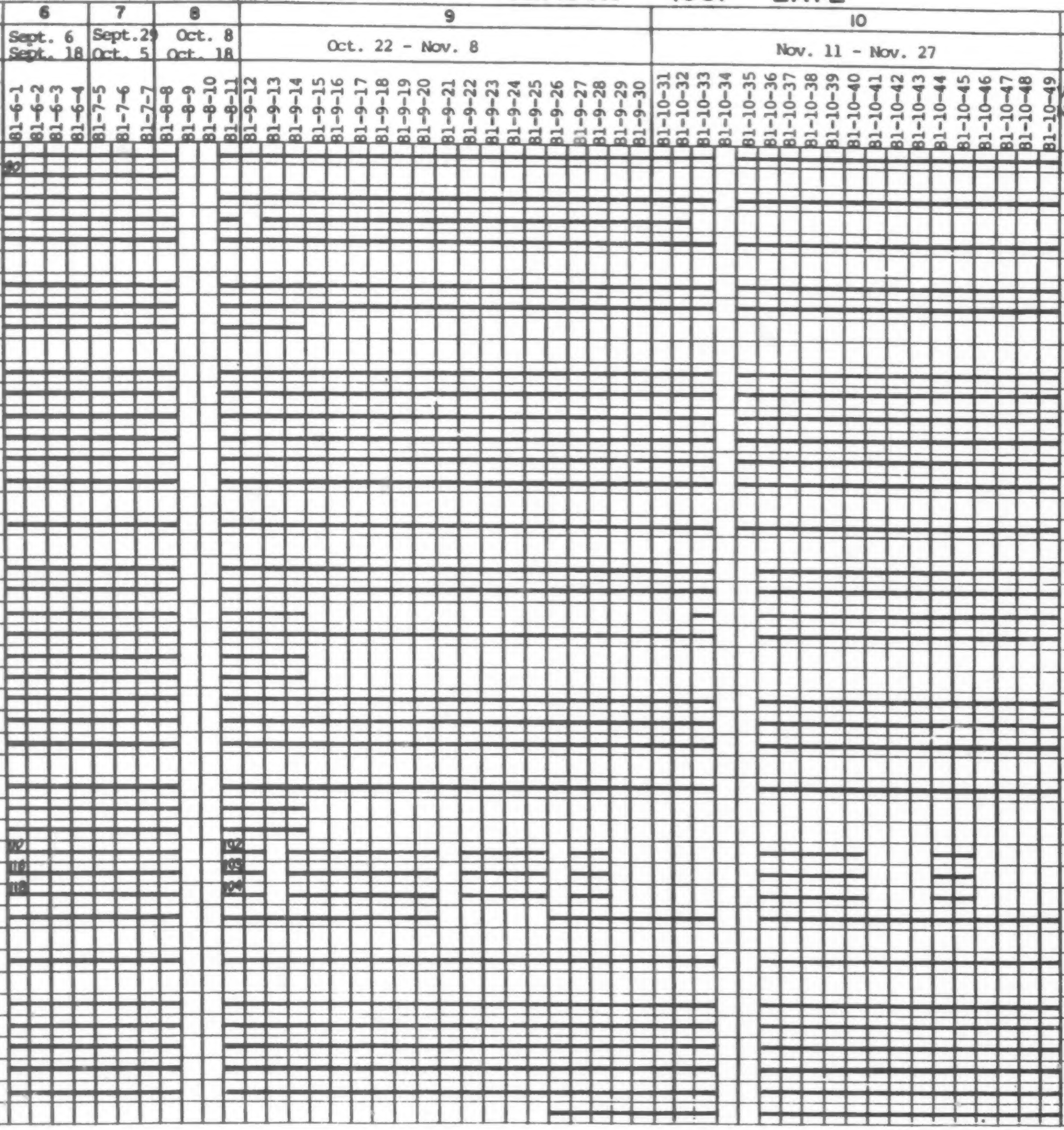


Chart No. 4 - Page 3

SENSOR STATUS — SEASON — 1981 — LATE

VOYAGE NUMBER	DATES	TAPE INDEX
6	Sept. 6 – Sept. 18	81-6-1 to 81-6-4
7	Sept.29 – Oct.5	81-7-5 to 81-7-7
8	Oct. 8 – Oct. 18	81-8-8 to 81-8-11
9	Oct. 22 – Nov. 8	81-9-12 to 81-9-30
10	Nov. 11 – Nov. 27	81-10-31 to 81-10-49

CATEGORY CODE	CHANNEL NUMBER	CONVERSION EQUATION	Verify Sept.1	Verify Nov.12
1A	136	με = 3.80n -1950.0	☒	☒
1A	137	με = 3.80n -1950.0	☒	☒
1A	138	με = 3.80n -1950.0		☒
1D	139	με = 3.80n -1950.0	☒	☒
1A	140	με = 3.82n -1955.8		☒
1D	141	με = 3.80n -1950.0	☒	☒
1A	142	με = 3.80n -1950.0	☒	☒
1H	143	με = 3.80n -1950.0		
1A	144	με = 3.80n -1950.0	☒	
1A	145	με = 3.82n -1955.8	☒	
1A	146	με = 3.80n -1950.0		☒
1A	147	με = 3.80n -1950.0	☒	☒
1A	148	με = 3.80n -1950.0	☒	☒
1A	149	με = 3.80n -1950.0	☒	☒
1H	150	με = 3.80n -1950.0		
1D	151	με = 3.80n -1950.0	☒	☒
1D	152	με = 3.80n -1950.0	☒	
1A	153	με = 3.82n -1955.8	☒	☒
1D	154	με = 3.80n -1950.0		
1A	155	με = 3.46n -1771.6	☒	☒
1A	156	με = 3.80n -1950.0	☒	☒
1D	157	με = 3.80n -1950.0	☒	☒
1A	158	με = 3.58n -1830.0		
1D	159	με = 3.80n -1950.0		
1A	160	με = 3.58n -1830.0	☒	☒
1D	161	με = 3.80n -1950.0	☒	☒
1D	162	με = 3.80n -1950.0	☒	☒
1A	163	με = 3.58n -1830.0	☒	☒
1H	164			
1H	165			
1D	166		☒	☒
1D	167	με = 3.80n -1950.0	☒	☒
1H	168			
1D	169	με = 3.80n -1950.0	☒	☒
1D	170	με = 3.80n -1950.0	☒	☒
1H	171			
1H	172	με = 3.80n -1950.0		
1H	173	με = 3.80n -1950.0		
1H	174	με = 3.46n -1771.6		☒
1H	175			
1E	176	με = 3.58n -1830		☒
1E	177	με = 3.58n -1830		☒
1E	178	με = 3.58n -1830		☒
1E	179	με = 3.58n -1830		☒
	180			

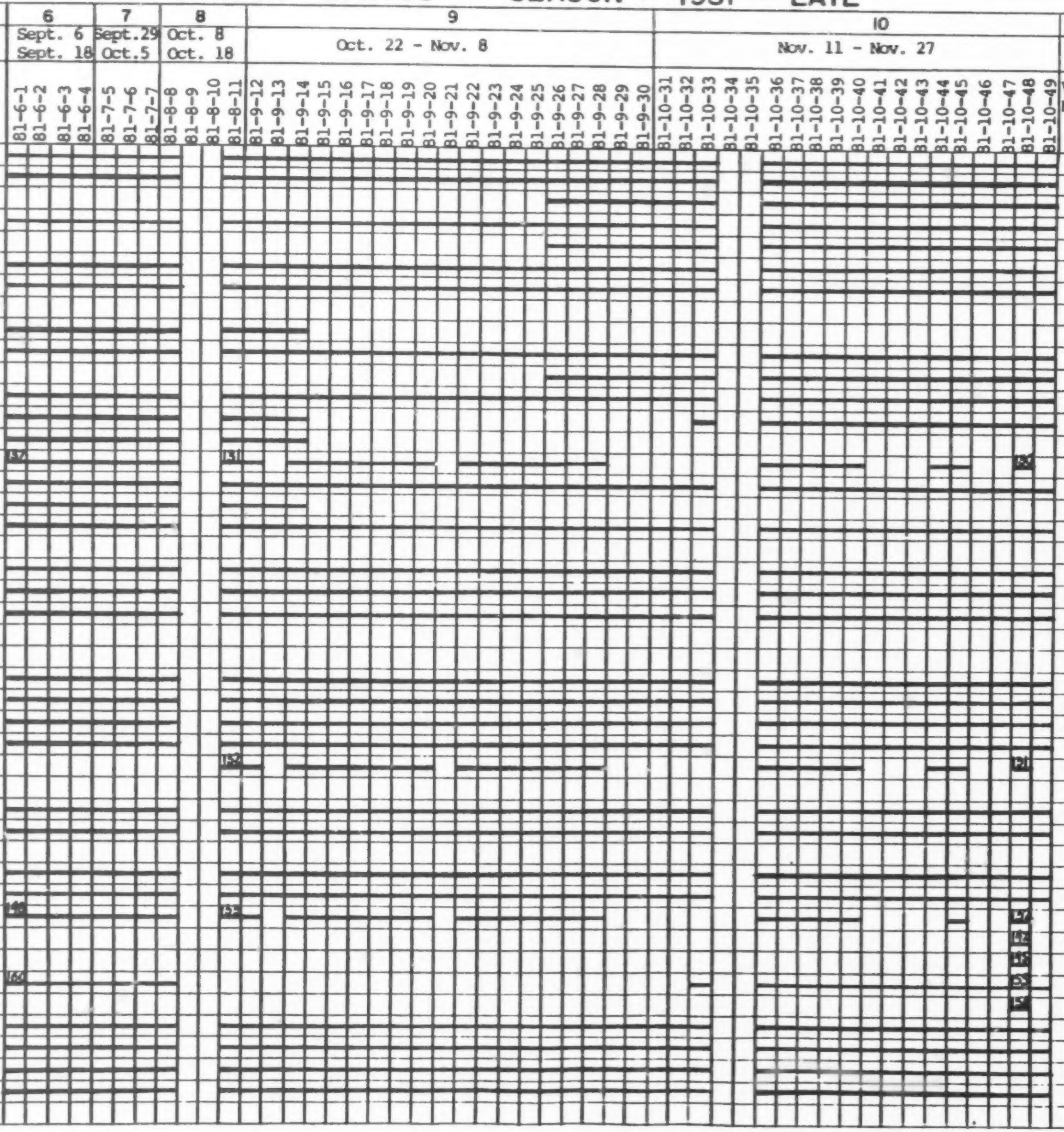


Chart No. 4 - Page 4

SENSOR STATUS -- SEASON — 1981 — LATE

CATEGORY CODE	CHANNEL NUMBER	CONVERSION EQUATION
3A	187	kPa =0.0336n
3B	188	kPa = 0.0336n
	196	
2A	198	kN = 2.29n 1177.2
2B	199	mm = 0.187n -8.47
4C	200	deg. = .078n -40 +Stbd. - Port
2C	201	deg. = .037n -19.25 +Ahead -Astern
4D	202	
2D	203	
2E	208	kNm = 1.475 (n 102.4)
2G	209	
	211	
4B	212	m/s/s = .048n -24.5
4B	213	m/s/s = .048n -24.5
2B	214	m/s/s = .048n -24.5
	215	
	216	
	217	
5H	224	miles = 0.0098n
5A	225	tenths = 0.0098n
5B	226	tenths = 0.0098n
5C	228	kPa = 0.0098n
5C	229	kPa = 0.0098n
5C	230	kPa 0 = < 7.15 =1 = > 7.15
5D	231	deg. C = 0.195n -111.5
5E	232	% = .098n
5F	233	kN = .139n - 7142
5G	234	deg. = 0.35n + 360
	235	
4E	236	knots = .030n
4F	237	deg. = ARCTAN $\frac{n_{237}-512}{n_{238}-512}$
4F	238	
4G	239	deg. = n/51.2 -10
4H	240	deg. = n/51.2 -10
2F	241	
	242	
	243	
2H	244	deg. = 0.0195n -10 +Ahead -Astern
4L	245	deg. = 0.090n -46.25 +Stbd. -Port
4J	252	M =.0024 or + 9.5
4K	253	M = .0024n +9.5
	255	

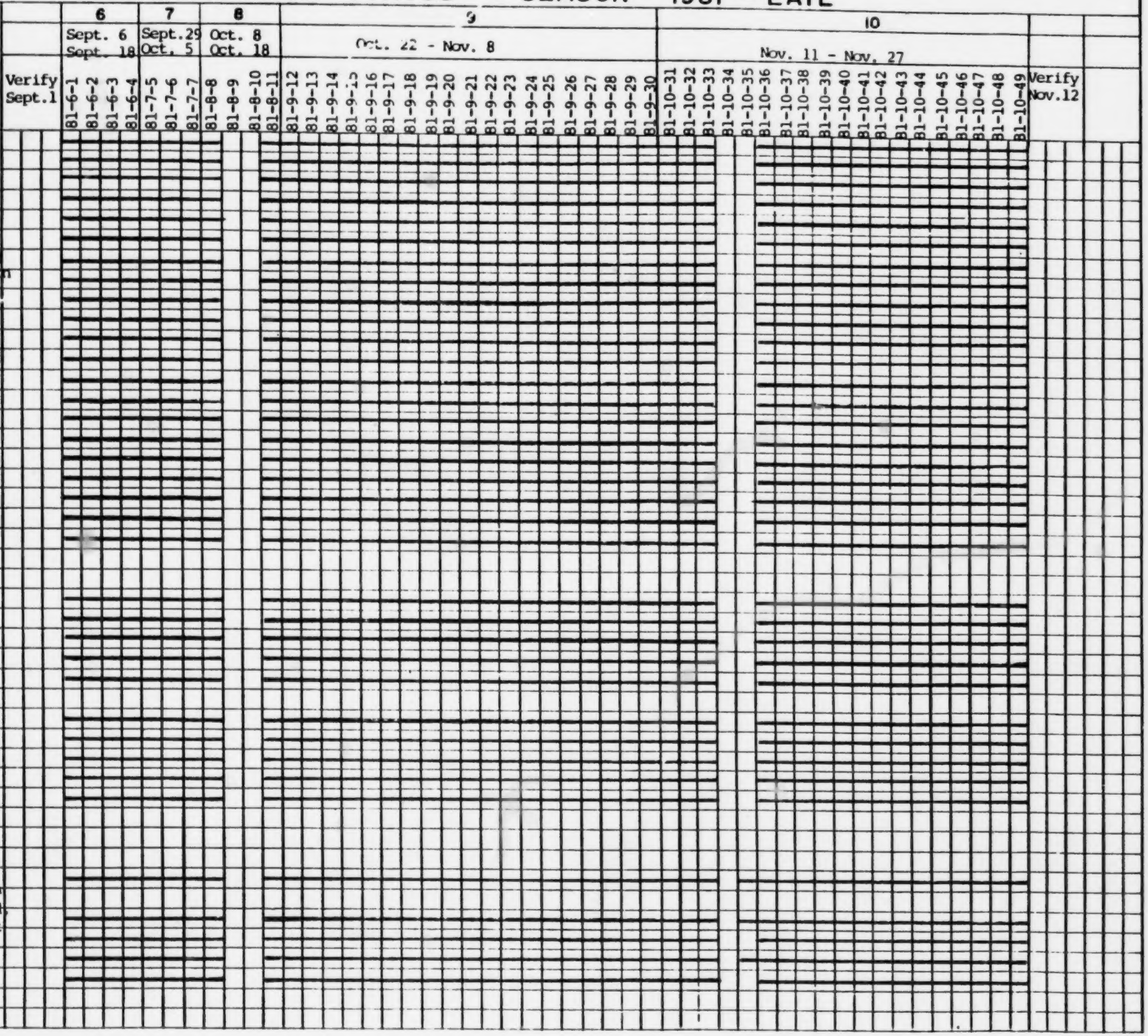


Chart No. 4 - Page 5

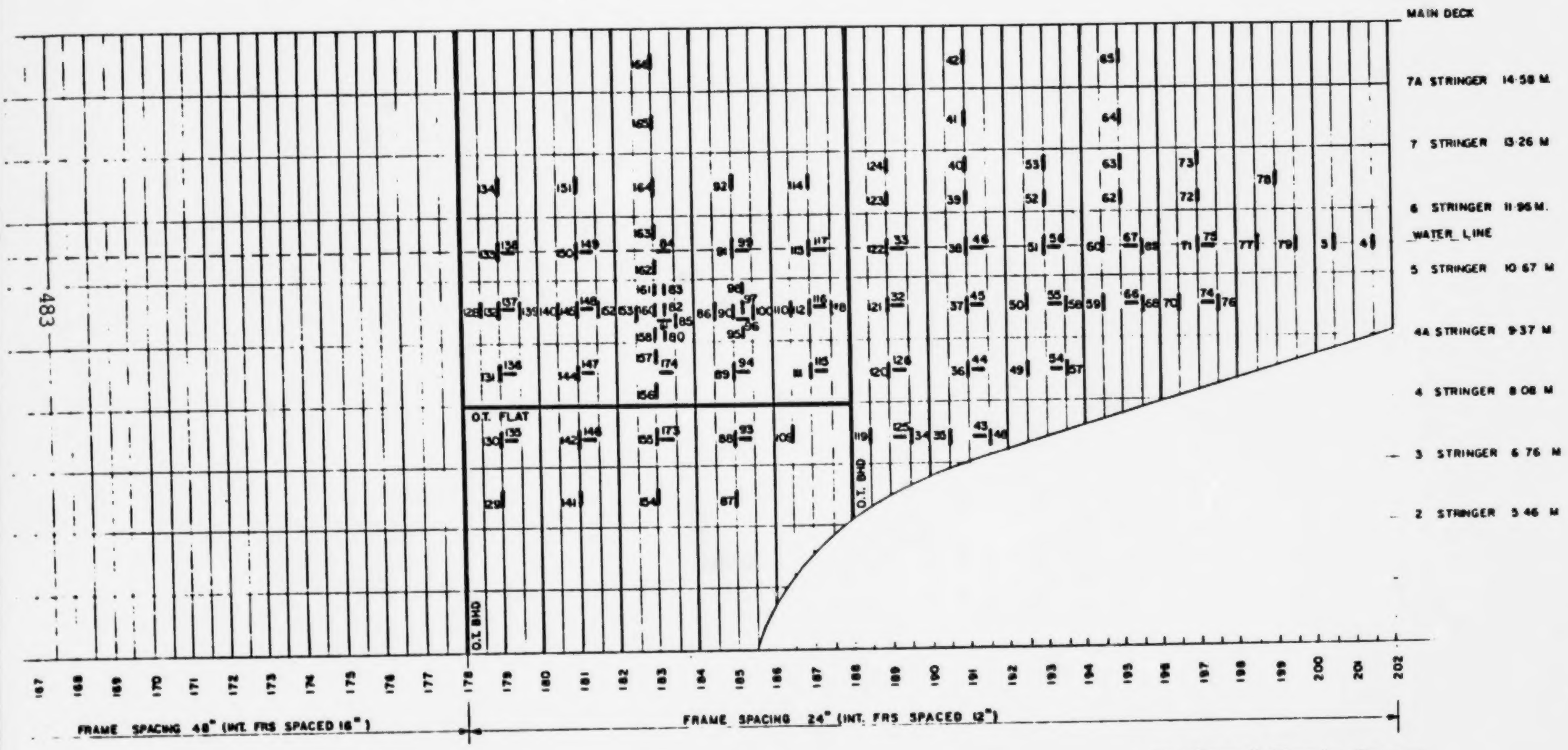

MAIN DECK
7A STRINGER 14·58 M.
7 STRINGER 13·26 M
6 STRINGER 11·96 M.
WATER LINE
5 STRINGER 10·67 M
4A STRINGER 9·37 M
4 STRINGER 8·08 M
3 STRINGER 6·76 M
2 STRINGER 5·46 M
O.T. BHD
O.T. FLAT
O.T. BHD
167
168
169
170
171
172
173
174
175
176
177
178
179
180
181
182
183
184
185
186
187
188
189
190
191
192
193
194
195
196
197
198
199
200
201
202
FRAME SPACING 48" (INT. FRS SPACED 16")
FRAME SPACING 24" (INT. FRS SPACED 12")

FIGURE 1

Starboard Strain Gauges
Placement & Orientation
1979 & 1980 Seasons
By Channel Number

NOT TO SCALE

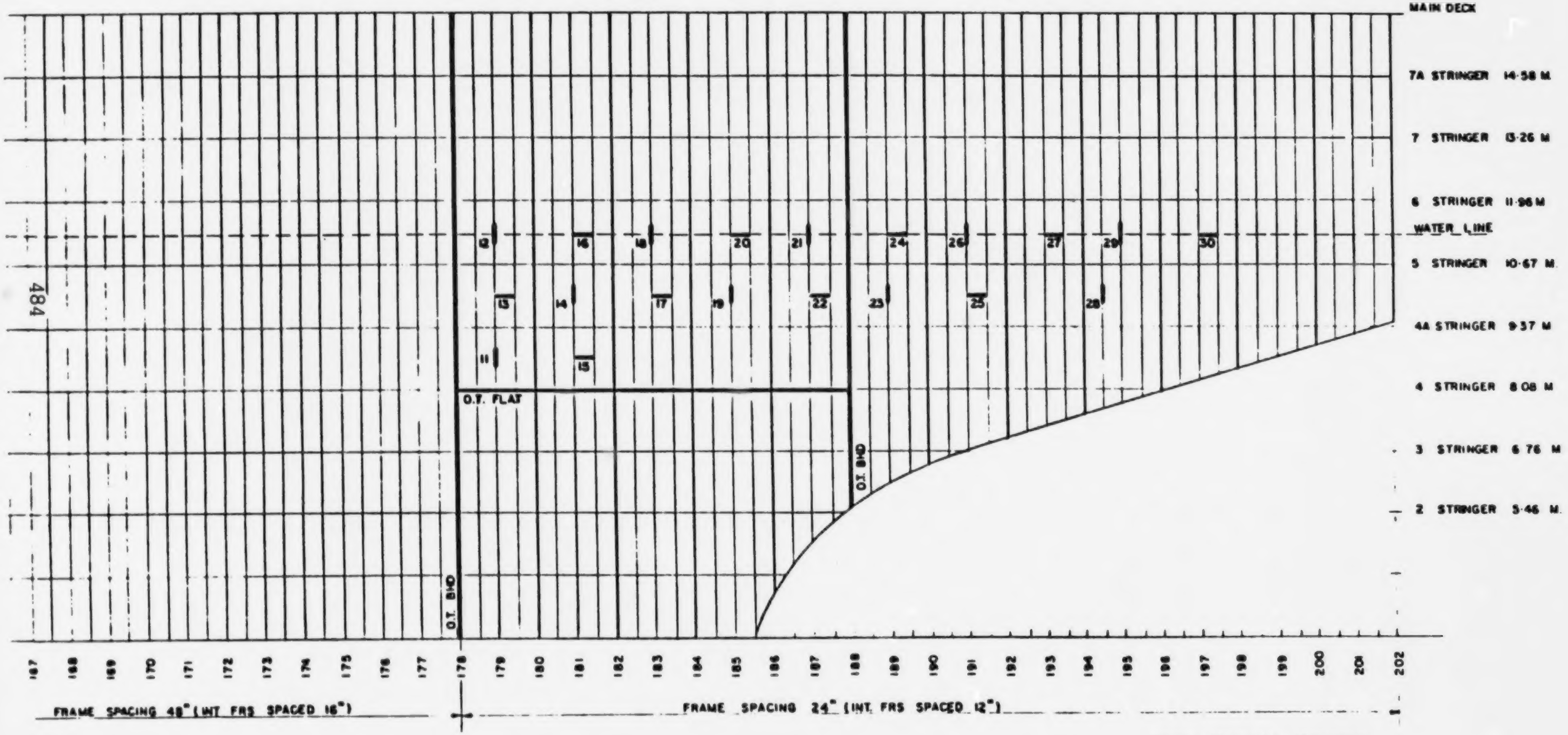

MAIN DECK
7A STRINGER 14·58 M
7 STRINGER 13·26 M
6 STRINGER 11·96 M
WATER LINE
5 STRINGER 10·67 M
4A STRINGER 9·37 M
4 STRINGER 8·08 M
3 STRINGER 6·76 M
2 STRINGER 5·46 M
O.T. FLAT
O.T. BHD
O.T. BHD
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
167
168
169
170
171
172
173
174
175
176
177
178
179
180
181
182
183
184
185
186
187
188
189
190
191
192
193
194
195
196
197
198
199
200
201
202
FRAME SPACING 48" (INT FRS SPACED 16")
FRAME SPACING 24" (INT FRS SPACED 12")

FIGURE 2

Port Strain Gauges
Placement & Orientation
1979 & 1980 Seasons
By Channel Number

NOT TO SCALE

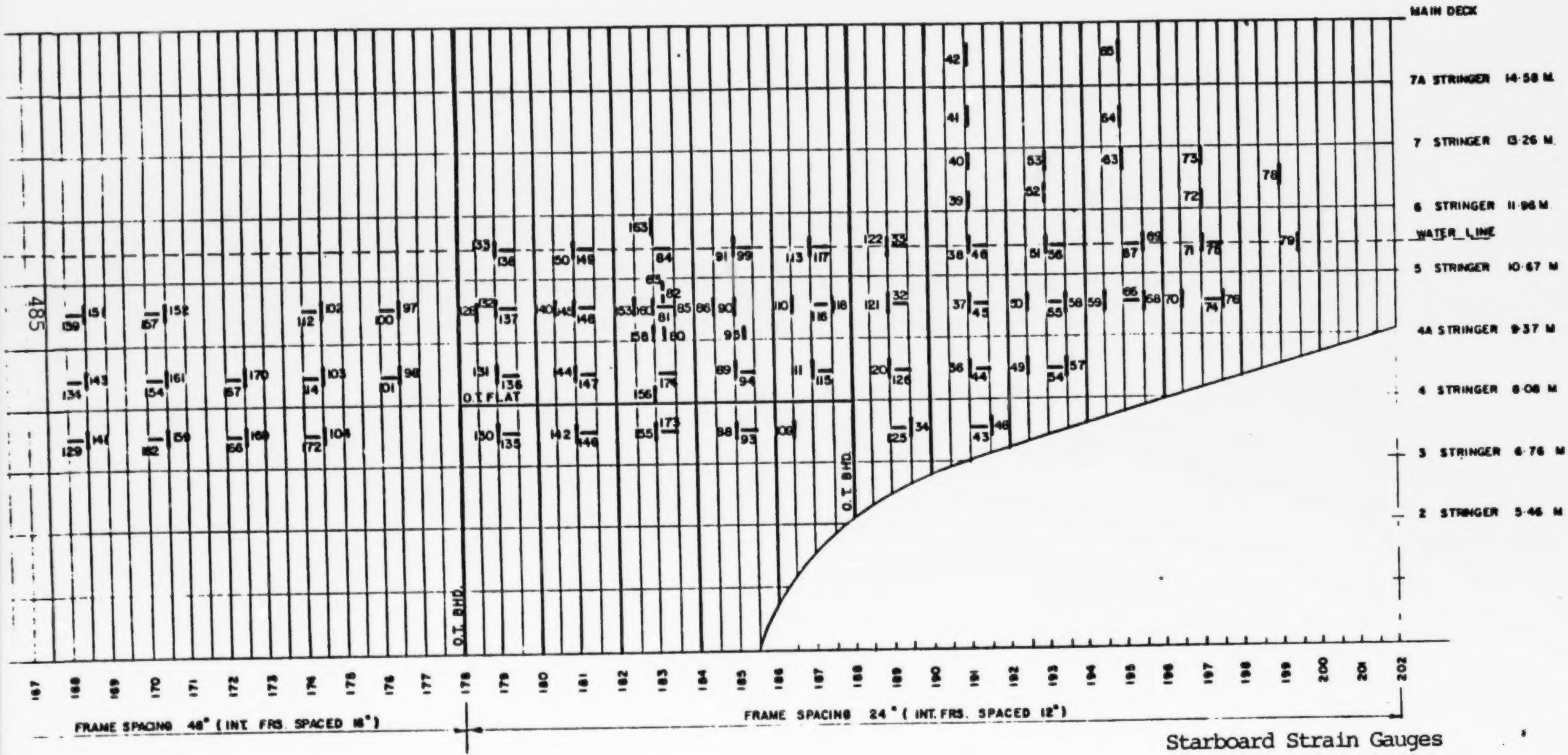
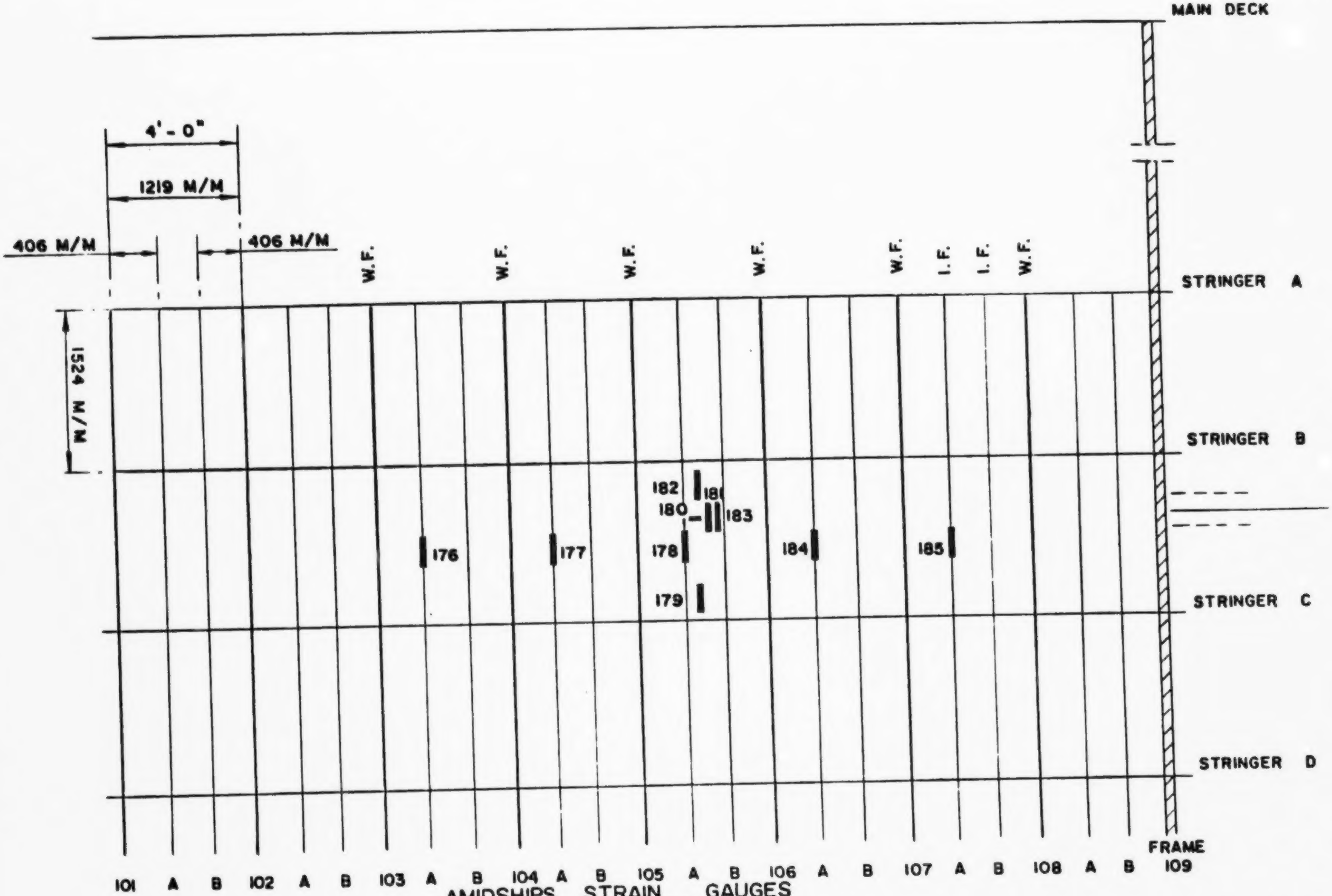

MAIN DECK
7A STRINGER 14·58 M.
7 STRINGER 13·26 M.
6 STRINGER 11·96 M.
WATER LINE
5 STRINGER 10·67 M
4A STRINGER 9·37 M
4 STRINGER 8·08 M
3 STRINGER 6·76 M
2 STRINGER 5·46 M
O.T. BHD.
O.T. FLAT
O.T. BHD.
167
168
169
170
171
172
173
174
175
176
177
178
179
180
181
182
183
184
185
186
187
188
189
190
191
192
193
194
195
196
197
198
199
200
201
202
FRAME SPACING 48" (INT. FRS. SPACED 16")
FRAME SPACING 24" (INT. FRS. SPACED 12")

FIGURE 3

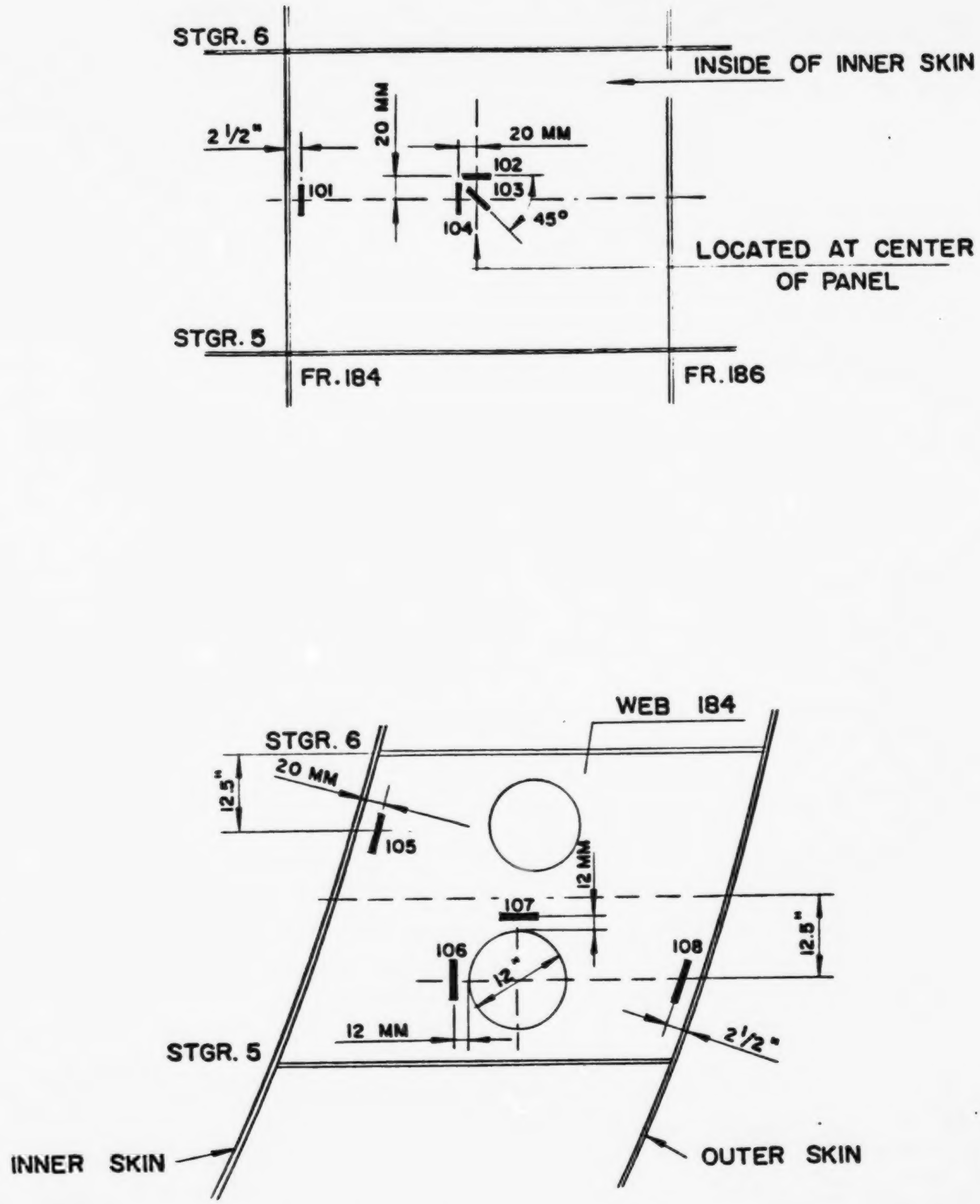
Starboard Strain Gauges
Placement & Orientation
1981 Season - By Channel
Number

NOT TO SCALE


MAIN DECK
STRINGER A
STRINGER B
STRINGER C
STRINGER D
FRAME
4'-0"
1219 M/M
406 M/M
406 M/M
1524 M/M
W.F.
W.F.
W.F.
W.F.
W.F.
I.F.
I.F.
W.F.
176
177
178
179
180
181
182
183
184
185
101
A
B
102
A
B
103
A
B
104
A
B
105
A
B
106
A
B
107
A
B
108
A
B
109

AMIDSHIPS STRAIN GAUGES
PLACEMENT & ORIENTATION
BY CHANNEL NUMBER

FIGURE 4

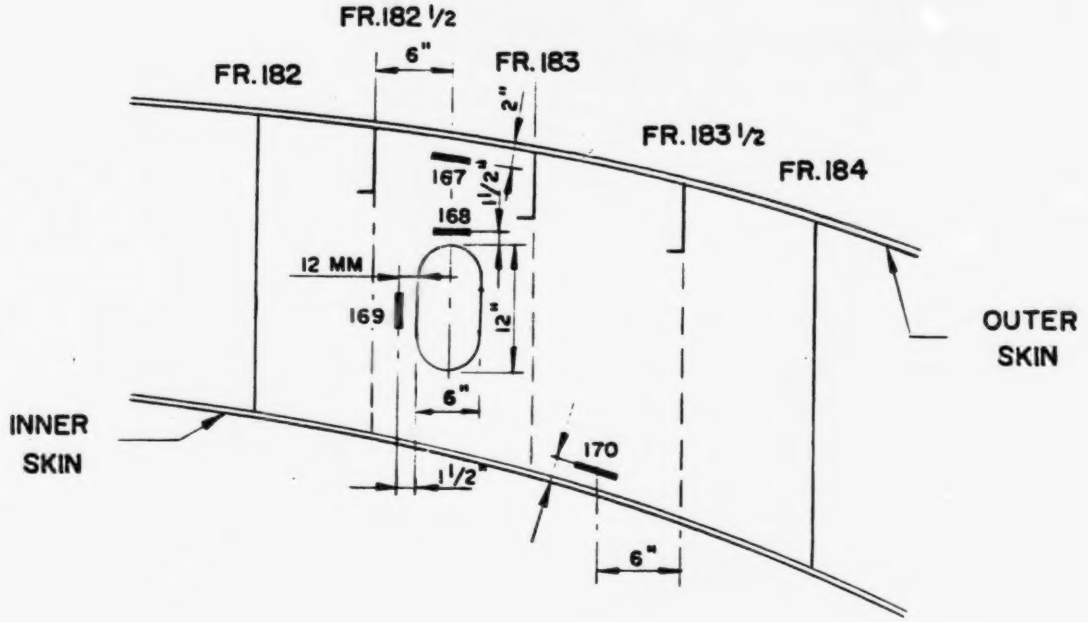

STGR. 6
INSIDE OF INNER SKIN
20 MM
2 1/2"
20 MM
102
103
101
104
45°
LOCATED AT CENTER OF PANEL
STGR. 5
FR. 184
FR. 186
WEB 184
STGR. 6
12.5"
20 MM
105
12 MM
107
12.5"
106
108
12"
12 MM
2 1/2"
STGR. 5
INNER SKIN
OUTER SKIN

INNER SKIN STRAIN GAUGES

PLACEMENT & ORIENTATION

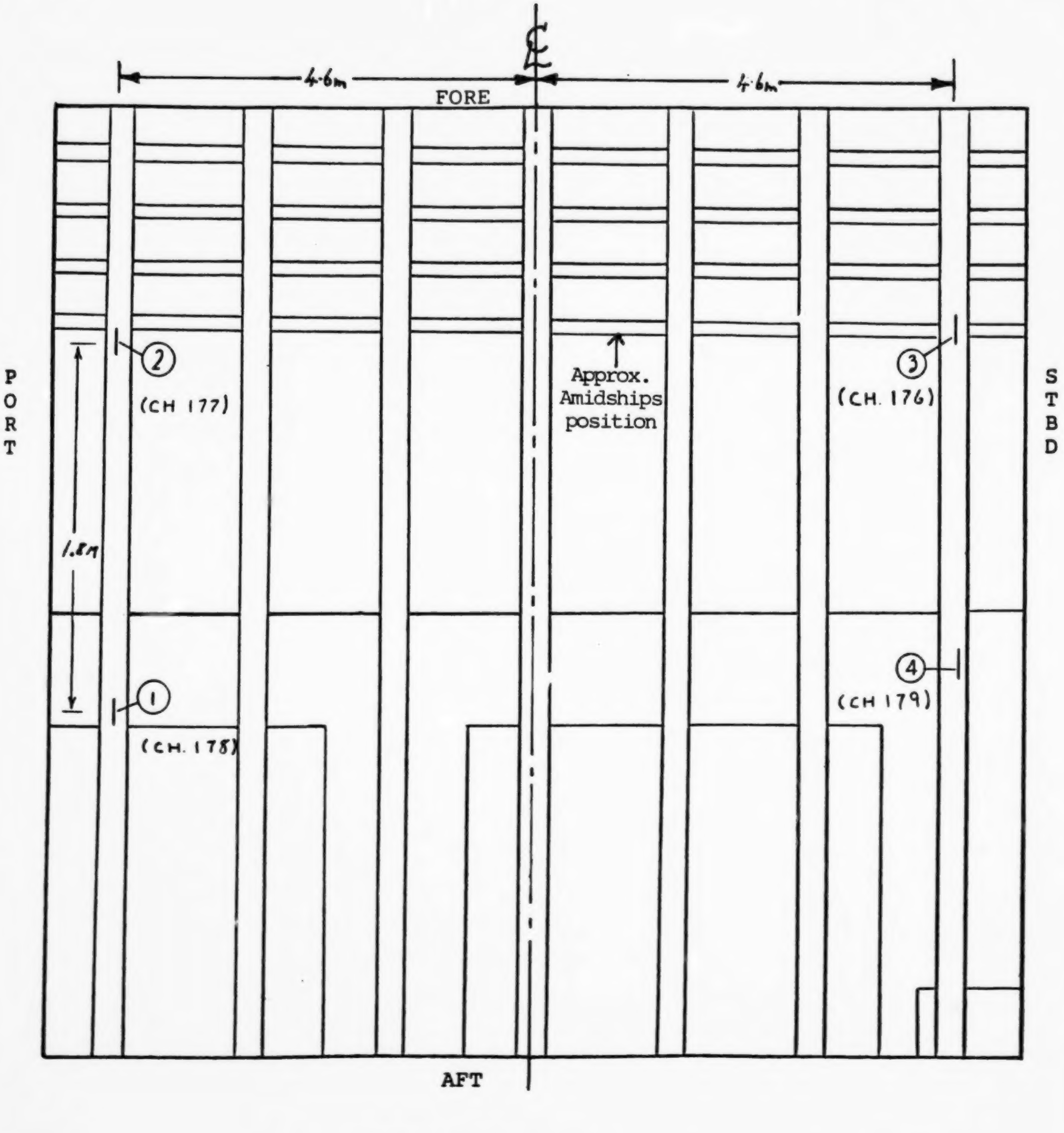
BY CHANNEL NUMBER

FIGURE 5


FR.182 1/2
6"
FR.182
FR.183
2"
FR.183 1/2
FR.184
167
1 1/2"
168
12 MM
169
12"
6"
OUTER SKIN
INNER SKIN
170
1 1/2"
6"

STRINGER NUMBER 5
STRAIN GAUGES
PLACEMENT & ORIENTATION
BY CHANNEL NUMBER

FIGURE 6



℄
4·6m
4·6m
FORE
PORT
STBD
AFT
1.8m
②
(CH 177)
③
(CH. 176)
Approx.
Amidships
position
④
(CH 179)
①
(CH. 178)

STRAIN GAUGE PLACEMENT
MIDSHIP DECK BEAMS
BUBBLER COMPARTMENT

Note: No. 1 gauge (Ch. 178) is located 1.37m forward of the coaming of the bubbler compartment.

FIGURE 7

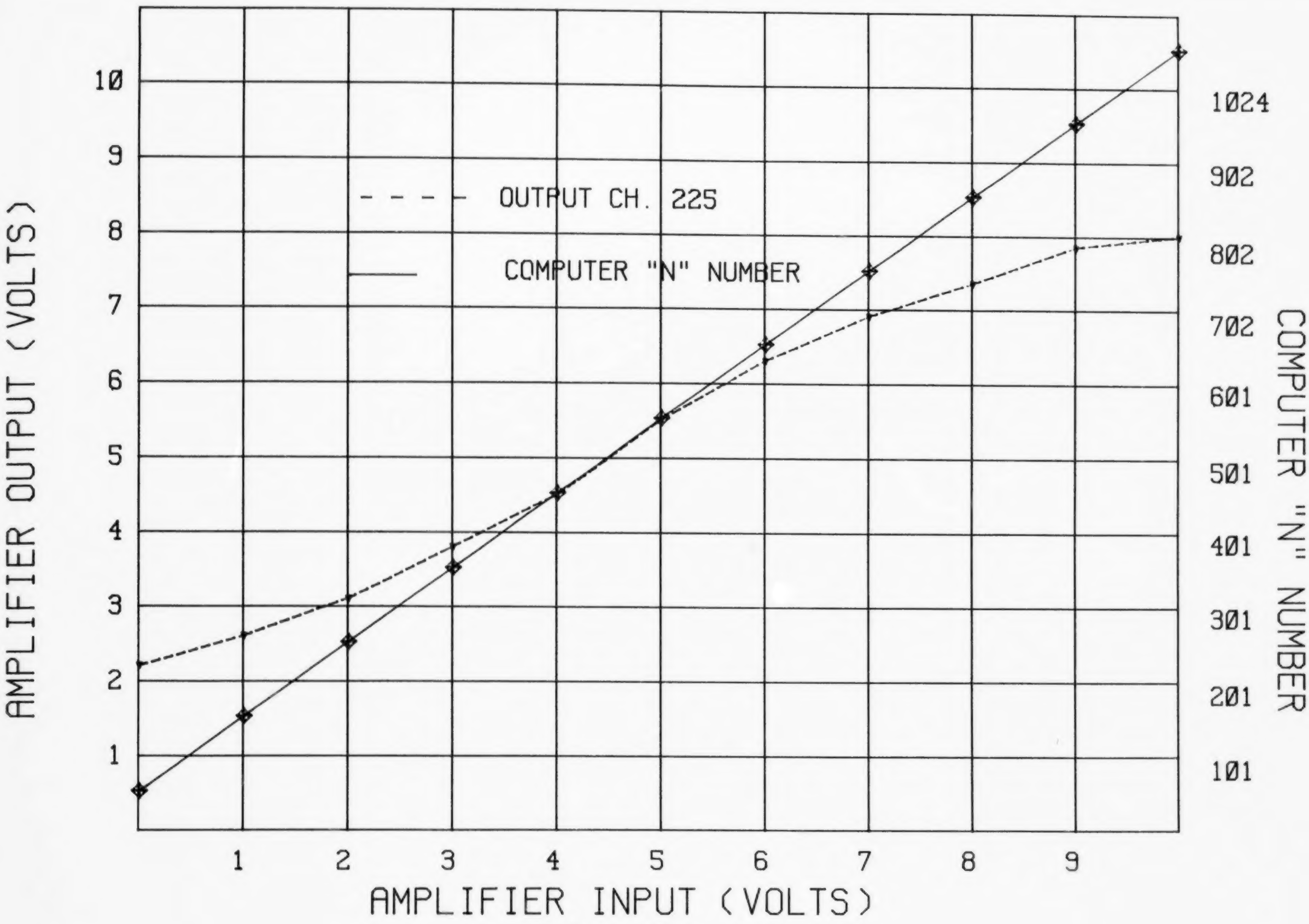

AMPLIFIER OUTPUT (VOLTS)
10
9
8
7
6
5
4
3
2
1
1
2
3
4
5
6
7
8
9
AMPLIFIER INPUT (VOLTS)
COMPUTER "N" NUMBER
1024
902
802
702
601
501
401
301
201
101
OUTPUT CH. 225
COMPUTER "N" NUMBER

FIGURE 8

APPENDIX 'B'

Description of
Data Acquisition System

Paper: Data Collection System on board
the ice-strengthened cargo vessel
M.V. Arctic for evaluation of
ship performance in ice

by:

J. G. German
J. D. Hearnshaw
J. Stirling
A. Benjamin
P. Timonin

THE SOCIETY OF NAVAL ARCHITECTS AND MARINE ENGINEERS
One Word Trade Center, Suite 1369, New York, N.Y. 10048

Spring Meeting/STAR Symposium, Ottawa, Ontario
June 17-19, 1981

Data Collection System on Board the Ice-Strengthened Cargo Vessel M.V. Arctic for Evaluation of Ship Performance in Ice

No. 26

J. G. German, Member, **J. Stirling** and **A. Benjamin**, Visitors and **P. Timonen**,
Member, German & Milne, Inc., Montreal, Quebec
J. D. Hearnshaw, Member, Transportation Development Centre, Ottawa, Ontario

ABSTRACT

A data acquisition system has been installed aboard the M.V. ARCTIC, a forerunner for a new generation of merchant ships designed for operation in the Arctic. The system records the ship's operational experience while navigating in ice in terms of the prevailing conditions and the ship's performance and response. Data recording is computer controlled and designed for flexibility of operation. Instrumentation consists of an array of strain gauges attached to the hull structure and configured to help determine ice breaking stresses using finite element analysis. Special sensors monitor the steering and propulsion systems and equipment on the navigation deck. Each sensor signal is sampled and digitized at a predetermined rate. All data is stored on magnetic tape for subsequent analysis ashore, but capability for a limited statistical analysis exists onboard. Operational experience has been acquired over two shipping seasons in both data collection procedures and system maintenance.

INTRODUCTION

In response to a request by a group of Canadian shipping companies, and in view of the technical and economic uncertainties of Arctic operations, the Federal Government in 1975 agreed to participate in the construction and operation of an ice breaking cargo vessel. As a condition of Government participation, it was made clear to all concerned that the technical and commercial experience derived from the venture would be made available to all Canadian shipbuilding and shipping companies who might wish to build similar icebreaking commercial vessels in Canada for the purpose of Arctic trade under the Canadian flag.

Management of the Federal commitment to this ship construction, the operating and testing program was assigned to Transport Canada. The Marine Administrator of that Department assumed the position of chairman of the joint operating company. Known as Canarctic Shipping Limited, the Crown holds 51% of the shares of Canarctic and commercial interests, grouped under the corporate name of North Water Navigation Company, own 49%. The Administrator also assumed responsibility for recording and publicizing the operational experience, delegating certain technical elements of this task to the Transportation Development Centre (TDC).

TDC is the arm of Transport Canada charged with promoting developments in all fields of transportation technology. Its mandate thus includes furtherance of Arctic technology, which in recent years has assumed great importance in view of the potential mineral and hydrocarbon mining possibilities in this region.

TDC, as is normal in such programs of technology and systems development falling within its mandate, undertook to fund, manage and implement the technological aspects of the program, in cooperation with operational branches of Transport Canada and other Federal Government Departments, particularly the National Research Council.

SHIP PARTICULARS

The vessel (Figure 1) was designed by CAMAT International Transportation Consultants Ltd. and built by Port Weller Drydock and Shipbuilding. Christened "ARCTIC", and delivered in June 1978, she is a 28,000 ton deadweight bulk carrier built in accordance with Class 2 standards of the Arctic Waters Shipping Pollution Preven-

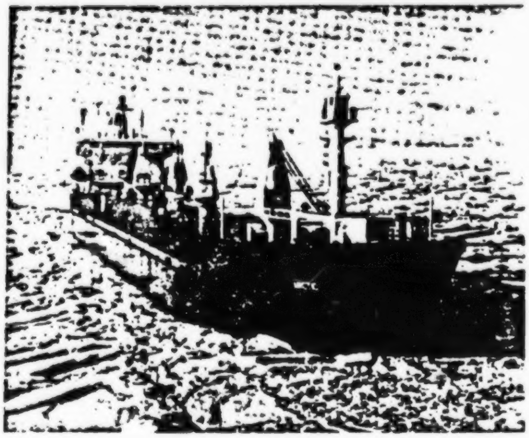


Figure 1 - M.V. ARCTIC

tion Regulations (ASPPR). This enables the "ARCTIC" to operate a shipping service to Nanasivik Mine in Strathcona Sound on Northern Baffin Island between 25th June and 15th November, and to Little Cornwallis Island between 15th August and 20th November each year.

The ship is fitted with a main propulsion diesel engine of 11,014 kilowatts and a controllable pitch propeller working in a fixed duct, which on trials, gave a speed of 15.5 knots. An added feature is an air bubbler system, intended to provide improved ice navigating capability. Technical data on the ship are listed in Table 1.

It was decided to evaluate and report upon the operational experience of the M.V. ARCTIC to provide a data base for research on future Arctic navigation. The ship's limitations as a test vehicle for such a program were fully appreciated at the time of program initiation. It was realized that because the ship met only ASPPR Class 2 Standards, much extrapolation would be needed to apply many of the findings to designs for future Class 10 ships having a 12 month ASPPR rating. In addition, as a commercial operation, the major portion of its navigating time would be spent crossing the open water of the Atlantic, or behind an escorting icebreaker. However the opportunity to obtain full scale field data (invariably superior to model predictions,) was considered important, even if somewhat limited.

PROGRAM OBJECTIVES

The overall technological objectives of the program were the following:

- verify the ASPPR Regulations in respect to the hull structure strength and the propulsion power requirements;
- record ice effects on the hull, environmental conditions and performance of the ship in ice cover;
- establish correlation factors for extrapolation of model scale data to full scale;
- ascertain the efficiency of resistance reduction systems such as the air bubbler system, or low friction hull coatings;
- provide an instructional base for improving expertise in Arctic operations.

In respect to the objectives, this paper identifies the parameters to be measured and the instrumentation required for the purpose.

TABLE I - M.V. ARCTIC - TECHNICAL DATA

Length Overall	209.55	metres
Length between Perpendiculars	196.60	metres
Moulded Draught	22.86	metres
Moulded Depth	15.24	metres
Moulded Breadth	10.97	metres
Summer Draught	10.82	metres
Block Coefficient	0.753	
Prismatic Coefficient	0.761	
Light Ship	9,276.1	tonnes
Displacement at 10.82 m. draught	37,724.1	tonnes
Deadweight at 10.82 m. draught	28,448.0	tonnes
Cargo Capacity	36,490.8	cubic metres
Propulsion Machinery - MAN Diesel	11,014	kilowatts
Generators	900	kW x 3
Complement	40	
Speed on Trials	15.5	knots
Cruising Range	14,000	Nautical miles

Detail performance data is required for evaluation to meet these objectives. Therefore, it was decided to install a suitable instrumentation system designed to provide a comprehensive data base by recording ship's operational performance in Arctic ice over a number of operating seasons, and to minimize interference with the vessel's commercial operations. Being a commercial carrier it was necessary to design the system to collect data without interfering with the vessel's normal operations. This consideration determined the wide range of parameters to be recorded and that unattended operation should be possible.

The manner in which the recorded data would be used or applied in the future had to be considered at the outset in designing the instrumentation system. Also, to ensure the eventual acceptability of test data, potential users were consulted in deciding on the test parameters to be measured.

INSTRUMENTATION DESIGN CONCEPT

The ASPPR specifies minimum construction standards and hull design criteria for vessels navigating in the various Arctic zones and seasons. The basis for shell plating and side framing scantlings, in different areas of the hull, is a series of assumed values for ice pressure contained in these Regulations (Table II). For a vessel of Arctic Class 2, these values range from 42.18 kiloponds per sq. cm in the bow area to 14.06 kiloponds per sq. cm in the region of the shell plating defined as the "Upper Transitional Area". Certain of these values may be modified to the bow of the ship, or where suitable side tanks are fitted over the total length of the mid-body of the vessel. Equations are provided to determine the requisite thickness of shell plating or the section modulus requirements for the shell support structure from the ice pressure valve.

Strains recorded during actual operations in ice can lead to conclusions regarding the adequacy and effectiveness of these standards. Ice pressures may thereby be determined for specific areas of the hull underwater structure. The ice impact loads and the frequency of encounter may also be determined and are of much interest inasmuch as they indicate the magnitude of peaking stresses, and frequency. Such data is pertinent to evaluation of the adequacy of Rule determination of the hull scantlings.

To further assess the effects of forces on the vessel during ice encounter, it was furthermore considered desirable to collect data on ship rigid body accelerations.

TABLE II - ICE PRESSURES FOR HULL SCANTLINGS

	Ice Pressures in pounds per square inch (kiloponds per square centimetre)						
	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
Item	Arctic Class	Bow Area	Lower Bow Area	Mid-Body Area	Lower Transition Area	Upper Transition Area	Stern Area
1	1	250* (17.58)	**	100* (7.03)	**	**	100* (7.03)
2	1A	400 (28.12)	210 (14.76)	260 (18.28)	180 (12.65)	130 (9.14)	325 (22.85)
3	2	600 (42.18)	320 (22.50)	400 (28.12)	260 (18.28)	200 (14.06)	500 (35.15)
4	3	800 (56.24)	420 (29.53)	530 (37.26)	370 (26.01)	260 (18.28)	660 (46.40)
5	4	1000 (70.30)	530 (37.26)	660 (46.40)	460 (32.34)	330 (23.20)	820 (57.65)
6	6	1200 (84.36)	640 (44.99)	750 (52.73)	520 (36.56)	370 (26.01)	940 (66.08)
7	7	1400 (98.42)	740 (52.02)	830 (59.76)	600 (42.18)	420 (29.53)	1050 (73.82)
8	8	1500 (105.65)	800 (56.24)	950 (66.79)	660 (46.40)	470 (33.04)	1200 (84.36)
9	10	1500 (105.65)	800 (56.24)	950 (66.79)	660 (46.40)	470 (33.04)	1200 (84.36)

* In an Arctic Class 1 ship, only that part of
(a) the bow area and stern area lying between the horizontal projections of the upper and lower edges of the mid-body area need be considered, and
(b) the mid-body area forward of amidships need be considered.

** In an Arctic Class 1 ship, ice pressure need not be considered as a factor in the design of the hull in the lower bow area, lower transition area and upper transition area, and the strength standards usually applied in ocean-going ships shall apply in these areas.

In selecting the grade of steel to be used in an icebreaker's hull it is important to recognize low temperature influence on the possibility of brittle fraction. Since steels with high notch tough quality at low temperature are expensive it is important from a practical standpoint to decide where, in the hull, the grades may be modified to less costly grades. The relationship of outside ambient temperature to the temperature at any point in the structure within the hull can be calculated, of course, but is subject to error. In order to obtain data of heat flow through hull structure it was decided to measure temperature on the structure at several points.

Whilst the primary objectives listed under Program Objectives were the determining factors in selecting the range and location of sensors, a secondary consideration should be mentioned, namely, the use of the real time data in helping to deduce the causes and analysis of actual ice damage.

Other hull structural features such as stern frame, ice horn, rudder, rudder stock and attachments were also to be evaluated in actual performance against the structural design standards set by the above Regulations. However, limitations on the program imposed by funding dictates only the rudder and rudder stock be monitored. This was done by measurement of rudder angle and hydraulic pressure at the steering engine cylinders.

It is expected that the data gathered on hull strength, power requirements and ice loadings will eventually be used by Designers, Classification Societies and regulatory agencies such as Marine Safety Branch of Canadian Coast Guard to update their standards. No doubt this would not be done with test results from a single ship or a single voyage. However, long-term data on this first vessel would be capable of indicating if the present criteria were adequate.

It was agreed that the performance of the main propulsion system should be monitored and recorded on a continuous basis in order to correlate its response to ice encounter and establish a relationship with ship speed under various operating condtions. It was considered desirable to establish the maximum thickness of ice broken in continuous icebreaking and ramming operations, as well as ship extraction capability and manoeuvring potential. Crucial test parameters in this regard are thrust, torque, RPM, pitch. It was also considered that data from the system would assist in determining the effectiveness of machinery protection devices and the operating characteristics of the diesel engines, gears and coupling devices.

This vessel was to be fitted with two significant auxiliary features to enhance its icebreaking capability, namely the Air Bubbler System to reduce resistance and a Controllable Pitch Ducted Propeller to increase the propeller thrust.

The justification for the Air Bubbler System, as an auxiliary device, was its effectiveness in reducing resistance to motion of the ship through ice and as a manoeuvring aid. Parameters recorded by the Instrumentation System to assist in evaluating the Air Bubbler System include ship speed, power (torque, RPM), ice characteristics, bubbler air control settings and its lateral extent. As a manoeuvring aid, measurement of the rate of change of ship's heading was added to the parameters to be measured.

With respect to the ducted propeller system the prime test parameters are thrust measurement and RPM. Evaluations of its effectiveness in protecting the propeller blades from ice ingestion and damage are perforce subjective.

The vessel was originally designed to have exterior shell surfaces painted with conventional marine paint coatings. Under the action of ice abrasion, however, these coatings would rapidly break down and be removed. An opportunity was seen to test the effectiveness of newly developed paint coatings. Such coatings not only adhere more tenaciously to the underwater hull of the icebreaker but also reduce its drag in ice, improving significantly the propulsive performance.

Assessments of hull ice friction factor would establish the effectiveness of these superior paint coatings which should be especially considered for use in selected areas of the ship's hull.

Factors in the Arctic environment that would need to be recorded quantitatively include all those affecting ship safety or efficiency in Arctic operations. Aspects relating to the physical characteristics of the ice cover being traversed were seen to be of paramount importance, as measures of the ability of the ice to either impede the progress of the vessel or to inflict damage on its structural parts. Thus desirable environmental test parameters should include ice thickness, flexural strength, mass, density, age, temperature, salinity, ice characterization, pressure, concentration, ridge structure and frequency, and snow cover. Other environmental conditions having a peripheral bearing on ice navigation but worthy of record are wind speed and direction, visibility, weather conditions, ambient temperatures and zones traversed by this vessel. Such data would not only be equated with ships propulsion performance but would also assist in analyzing the rationale for regulatory restraints on seasonal operation periods and zones for this and similar vessels.

The hull form of the M.V. ARCTIC was tank-tested and evaluated in an ice model basin. Similarly, the ducted propeller was model tested to predict the thrust components associated with its design. Predictions of full scale performance in open water and in ice of varying thicknesses were made, applying derived model co-relation factors and assumed ice characteristics. In order to check these assumptions, and refine them for application to further model studies, the full scale performance in ice and open water of this vessel could be extensively measured and related to these model test results. The main test parameters for evaluating the propulsion peformance are ship speed and power, displacement, draft, trim, sea state or ice conditions, and weather conditions.

Peripheral aspects are hull/ice frictional coefficients and hull surface roughness. Predictions were also made from model experiment and analysis of the ice performance of such auxiliary equipment as the air bubbler system, the variable pitch propeller and the propeller duct. The full scale performance of these auxiliary features would be analyzed in respect to their effectiveness under varying ice and operational conditions to establish means of refining future model testing and prediction techniques.

Considerations of all the above requirements thus became the basis of design for the instrumentation system, which was undertaken by the successful tenderer following an open competition, in which Transportation Development Centre sought a consultant or consortium of experts knowledgeable in both naval architecture and shipboard electronics.

SYSTEM REALIZATION

In order to implement this program to obtain comprehensive data essential to the project a computer controlled instrumentation system was conceived to make appropriate measurements throughout the ship with minimum operator participation.

The system is controlled by a central computer that monitors and directs operations within the system from the ship's laboratory (Figure 2). Sensors situated at key locations on the ship continually monitor the operating and response parameters of the ship The sensor interrogration is sequenced by an operator through the operating software, and the data obtained stored on magnetic tape for subsequent analysis.

Five specific aspects of the ship's operations are monitored by the system:

- hull structure
- propulsion system
- auxiliary systems
- ship performance
- environmental conditions

Sensors used for each of these aspects are listed in Table III, and a detailed discussion of each follows in subsequent sections. A layout diagram of the data collection system indicating the parameters monitored is shown in Figure 3.

HULL STRUCTURE SENSORS

As the appraisal of the structural strength of the ship in various ice conditions is a primary objective, the most important measurements, as well as the most difficult to obtain, are those of the hull structure strains and temperature. A study was carried out to decide the number and location of strain gauges to be used. These were installed during the final stages of the construction of the ship.

The majority of these strain gauges are located forward on the starboard side in order to obtain strain data in sufficient detail to make an accurate assessment of the behaviour of the structure from ice action (Figure 4). A smaller number located forward on the port side provides additional data for making statistical studies of frequency of ice impacts and strain levels (Figure 5).

Figure 2 - View of Laboratory Computer Centre

TABLE III

SENSOR ALLOCATION

Measured Parameter	Derived Parameter	Type of Sensor	Range	Number of Channels
1. HULL STRUCTURE				
Structural Strains Starboard Bow	Ice Loads Impact Counts Pressures	Strain Gauge Ailtech Type SG 129	±2000 Microstrains	139
Structural Strains Port Bow	Ice Loads Impact Counts Pressures	Strain Gauge Ailtech Type SG 129	±2000 Microstrains	20
Structural Strains Field Ice Pressure Midship Hull	Ice Loads Impact Counts Field Ice Pressure	Strain Gauge Ailtech Type SG 129	±2000 Microstrains	10
Hull Temperature Above Water Line	Temperature Gradient	Thermistors Fenwal Electric Type GB 32P2	-20° to +50° C	2
Hull Temperature Below Water Line	Temperature Gradient	Thermistors Fenwal Electric Type GB 32P2	-20° to +50° C	2
2. PROPULSION SYSTEM				
Shaft Thrust	Total Thrust	Renk Thrust Meter Type-RCIK-3	±120 MegaPons	1
Fuel Rack Position	Fuel Consumption Power	Follow-up Potentiometer	0-100% of full travel	1
Propeller Pitch Response	Pitch Change Resistance	Follow-up Potentiometer	16° - Astern 22° - Ahead	1
Propeller Pitch OD Box-Differential Pressure	Propeller Spingle Torque	Pressure Transducer SELABS Type SE 21/V	0 - 14 Mega-Pascal	1
Shaft Torque	Shaft Horsepower	S/G Bridge & Telemetry Torque Meter	0 - 0.8 Mega-Newton-metres	1
Engine RPM	Brake Horsepower	Ship Engine Instrumentation	RPM 0 - 600	1
Shaft RPM	Shaft Horsepower	Ships Shaft Tachometer	RPM 0 - 200	1
Propeller Pitch Command	-	Follow-up Potentiometer	±10 Ahead -10 Astern	1

Measured Parameter	Derived Parameter	Type of Sensor	Range	Number of Channels
3. AUXILIARY SYSTEM				
Air Pressure Bubbler Compressor Starboard	Air Volume Flow	Pressure Transducer Entran EPS-1032-50	0-35 Kilo-Pascal	1
Air Pressure Bubbler Compressor Port	Air Volume Flow	Pressure Transducer Entran EPS-1032-50	0-35 Kilo-Pascal	1
Bubbler Valve Status	Bubbler Mode	Decoding Relays- From Modem of Valve Status	ON-OFF	3
Rudder Command	-	Follow-up Potentiometer	37.5° Port 37.5° Stbd.	1
4. SHIP PERFORMANCE				
Accelerations Heave, Surge, Sway - Fwd.	Ship Motions Ice forces	Accelerometers Entran Devices Inc. EGC-240-107	±10G	3
Accelerations Heave, Surge Sway - Aft	Ship Motions Ice forces	Accelerometers Entran Devices Inc. EGC-240-107	±10G	3
Rudder Angle Response	Rudder Change Resistance	Follow-up Potentiometer	37.5° Port 37.5° Stbd.	1
Steering Gear Differential Pressure	Rudder Stock Torque	Pressure Transducer SELABS Type SE 21/V	0 - 35 Mega-Pascal	1
Ships Speed	Resistance	Doppler Log-Sperry Type SRD-301 12 Bit Digital Number	0-50 Knots	1
Ships Head	Turning Rate	Gyro Compass Type 37 Sine & Cosine of Heading	0-360°	2
Pitch	Ship Motions	Vertical Gyro-Humphry Inc. Model VM02-0127-1 Pitch Axis	0-40 Degrees Head & Stern	1
Roll	Ship Motions	Vertical Gyro-Humphry Inc. Model VM02-0127-1 Roll Axis	0-40 Degrees Port & Starboard	1
Draught (Fwd)	Displacement Wetted Surface	Manual Operation Decade Switch	7-12 Metres 1/2 Metre Steps	1
Draught (Aft)	Displacement Wetted Surface	Manual Operation Decade Switch	7-12 Metres 1/2 Metre Steps	1

Measured Parameter	Derived Parameter	Type of Sensor	Range	Number of Channels
5. ENVIRONMENTAL CONDITIONS				
Cloud Cover	-	Manually Operated Decade Switch	0-10 Tenths Cover	1
Ice Cover	-	Manually Operated Decade Switch	0-10 Tenchs Cover	1
Barometric Pressure	-	Manually Operated Decade Switches	0-100 Kilo-Pascals	3
Air Temperature	-	Manually Operated Bourns Knobpot	0-100° C	1
Relative Humidity	-	Manually Operated Bourns Knobpot	0-100%	1
Wind Speed	Wind force and moment	Anemometer Tachometer-Meteorological Instrumentation	0-100 Knots	1
Wind Direction	Wind force and moment	Wind Vane Synchro. Meteorological Instrumentation	0-360° to Ship's Head	1
Visibility	-	Manually Operated Decade Switch	0-10 Nautical Miles	1

In the midships area, gauges were installed principally to measure field pressure effect.

The distribution of all gauges is given below (Table IV)

TABLE IV

DISTRIBUTION OF GAUGES

	Starboard Fwd.	Port Fwd.	Midship
Intermediate Frames	85	10	5
Web Frames	4	-	-
Stringers	4	-	-
Inner Shell	4	-	-
Outer Shell	42	10	5

Gauge locations on the starboard forward array were chosen after some study to provide sufficient gauges over the area to enable various analyses to be made of the ice effects, including ice loads, area of impact (when it occurred within the gauge array), relative adequacy of plating and supporting structural elements, distribution, frequency of encounter, stress levels and other detailed aspects of the standard response. Indirectly, deductions are also possible of the size (mass) of ice floes encountered. Gauge location analysis was performed by Fenco Consultants of Calgary and was aimed at these objectives whilst economizing as far as possible on the number of gauges needed. A finite element analysis of the structure was made to determine the strucutral strain response to random levels, it being decided to calculate total ice load at a given moment by the strain pattern in the structure at that moment. Finite element analysis done on coarse and fine grids showed relatively small differences and it was decided, again to economize - this time on analysis labour - to utilize a coarse grid for purposes of analysis. A check was then conducted to verify the finite element prediction. This check was a full scale calibration of the entire panel wherein known point loads were applied and strains recorded from the gauged array. This calibration did in fact verify the validity of using finite element analysis to deduce ice loads from strains. More about the calibration is discussed under "System Tests and Calibration".

The strain gauges are of the hermetically sealed temperature compensated type, welded to the ship structure. After installation they were covered with the same coal tar epoxy coating used to protect the ballast tanks. The thermistors are also hermetically sealed, weld-on gauges, mechanically similar to the strain gauges.

The gauge array mounted on the port side forward consists of 20 gauges, 10 of which are mounted on plate panels, 10 mounted on frames, webs or stringers.

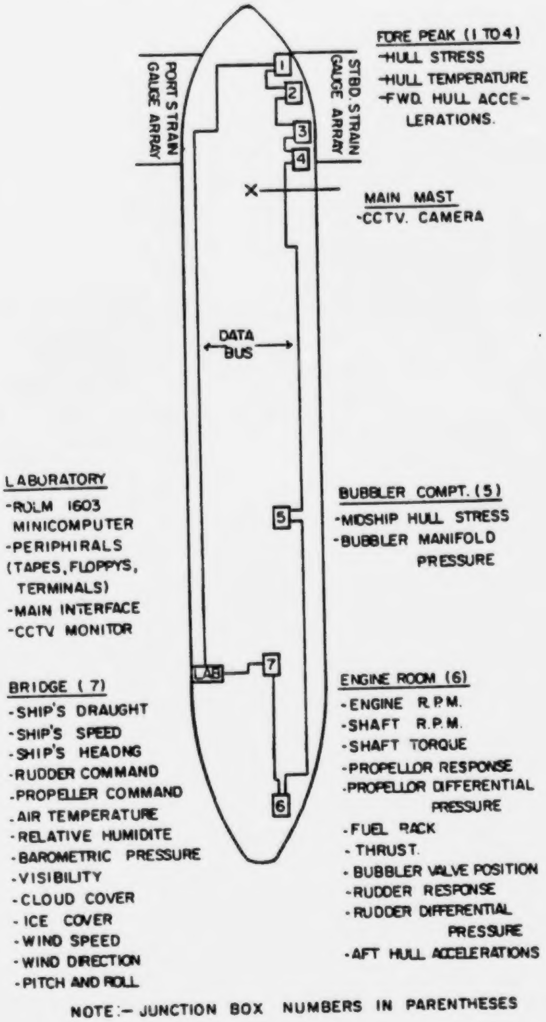

FORE PEAK (1 TO 4)
-HULL STRESS
-HULL TEMPERATURE
-FWD. HULL ACCELERATIONS.
PORT STRAIN GAUGE ARRAY
STBD. STRAIN GAUGE ARRAY
1
2
3
4
MAIN MAST
-CCTV. CAMERA
DATA BUS
LABORATORY
-ROLM 1603 MINICOMPUTER
-PERIPHIRALS (TAPES, FLOPPYS, TERMINALS)
-MAIN INTERFACE
-CCTV MONITOR
BUBBLER COMPT. (5)
-MIDSHIP HULL STRESS
-BUBBLER MANIFOLD PRESSURE
5
LAB
7
BRIDGE (7)
-SHIP'S DRAUGHT
-SHIP'S SPEED
-SHIP'S HEADNG
-RUDDER COMMAND
-PROPELLER COMMAND
-AIR TEMPERATURE
-RELATIVE HUMIDITE
-BAROMETRIC PRESSURE
-VISIBILITY
-CLOUD COVER
-ICE COVER
-WIND SPEED
-WIND DIRECTION
-PITCH AND ROLL
ENGINE ROOM (6)
-ENGINE R.P.M.
-SHAFT R.P.M.
-SHAFT TORQUE
-PROPELLOR RESPONSE
-PROPELLOR DIFFERENTIAL PRESSURE
-FUEL RACK
-THRUST
-BUBBLER VALVE POSITION
-RUDDER RESPONSE
-RUDDER DIFFERENTIAL PRESSURE
-AFT HULL ACCELERATIONS
6
NOTE:- JUNCTION BOX NUMBERS IN PARENTHESES

FIG. 3 LAYOUT DIAGRAM OF DATA ACQUISITION SYSTEM

The purpose of this array is primarily to pick up strain levels reached in the different parts of the structure, and count and collate the ice impacts. Strains reported by these gauges add to the data collected by the Starboard array.

The midship gauges, 10 in number, are located to pick up strains created by ice field pressure. By using the ship as a "pressure cell" and stationing it in a field under pressure, measurements will be possible, adding to an understanding of field pressure.

Gauges located on intermediate frames are placed on the flange between stringers. Some frames are more fully instrumented i.e. frame 183 (Figure 6), up to the main deck level. Extra gauges have been fitted on this frame at points close to stringers 4A and 5 to more adequately describe the strain variation along a frame. Rigid stringers and a bulkhead divide the zone between frames 188 and 192 into a number of smaller areas. It was decided therefore, to add additional gauges to this zone. Main frames 189 and 191, (Figure 7), extend to the main deck. These frames are instrumented up to this level. Extra gauges have been placed close to stringer 6 to more adequately describe the strain pattern along the frames. Additional gauges have been added to the structure bounded by frames 183 to 185 1/2 and stringers 5 to 6 in order to provide more comprehensive data on the behaviour of a typical panel.

For analysis of behaviour of a web frame, No. 184 was chosen and additional gauges fitted between stringer 5 and 6 (Figure 8). Since the web frame behaves as a deep beam, the outer gauges should indicate the maximum strain. The two gauges located close to the holes are for measuring stress concentrations in the web around the hole.

For analysis of behaviour of a stringer, No. 5 was chosen and additional gauges fitted between frames 184 and 186 (Figure 9). The rationale for gauge location is similar to that for the web frame.

To study the behaviour of the inner shell a panel between frames 184 and 196 was chosen, between stringer 5 and 6 (Figure 10). Principal stresses are measured by the gauge cluster in the centre of the panel. The single gauge close to frame 184 provides additional information on web frame behaviour.

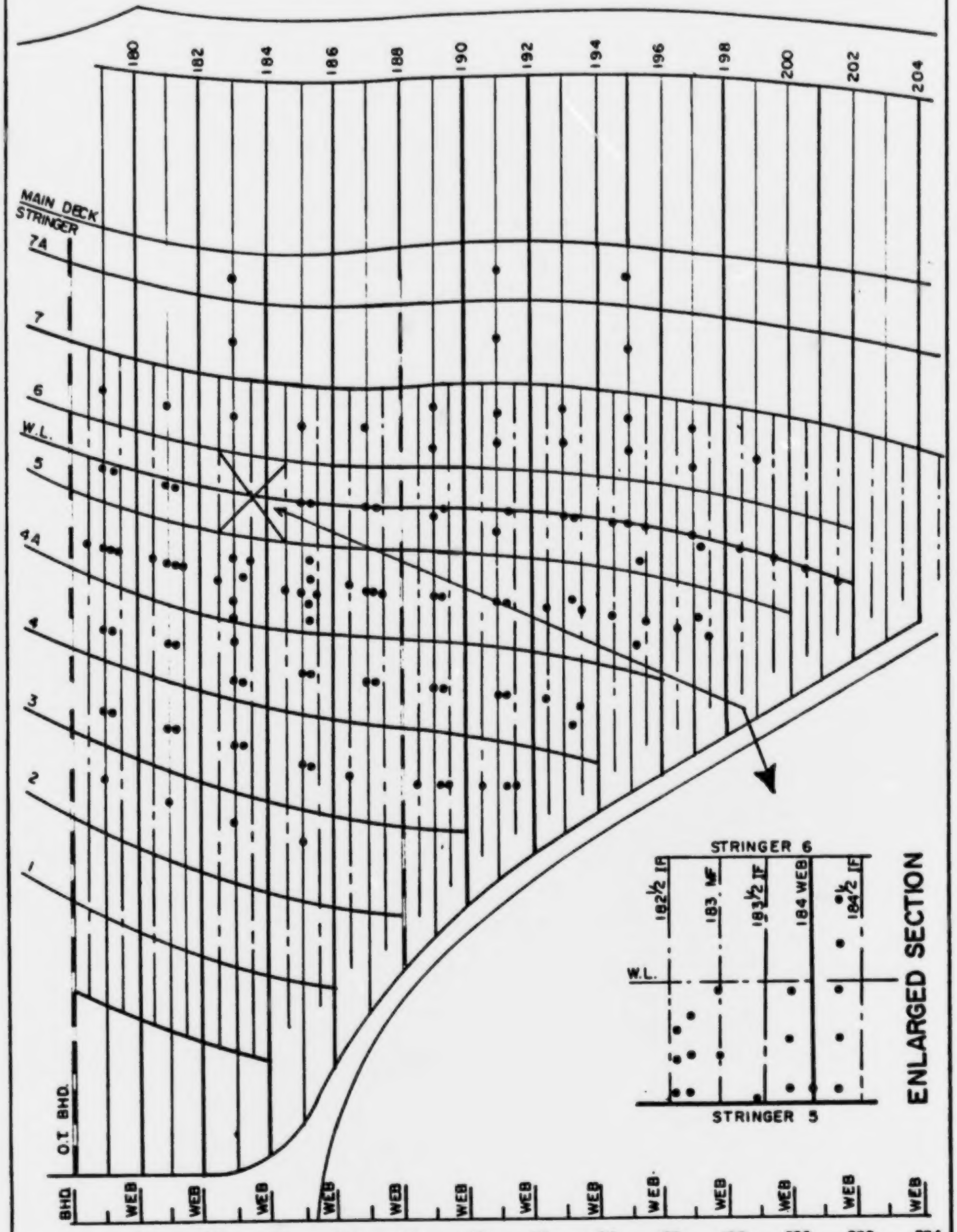

180
182
184
186
188
190
192
194
196
198
200
202
204
MAIN DECK STRINGER
7A
7
6
W.L.
5
4A
4
3
2
1
O.T. BHD.
BHD
WEB
178
180
182
184
186
188
190
192
194
196
198
200
202
204
STRINGER 6
182½ IF
183 MF
183½ IF
184 WEB
184½ IF
W.L.
STRINGER 5
ENLARGED SECTION

FIG. 4 LOCATION OF STRAIN GAUGES FWD. - STBD. SIDE

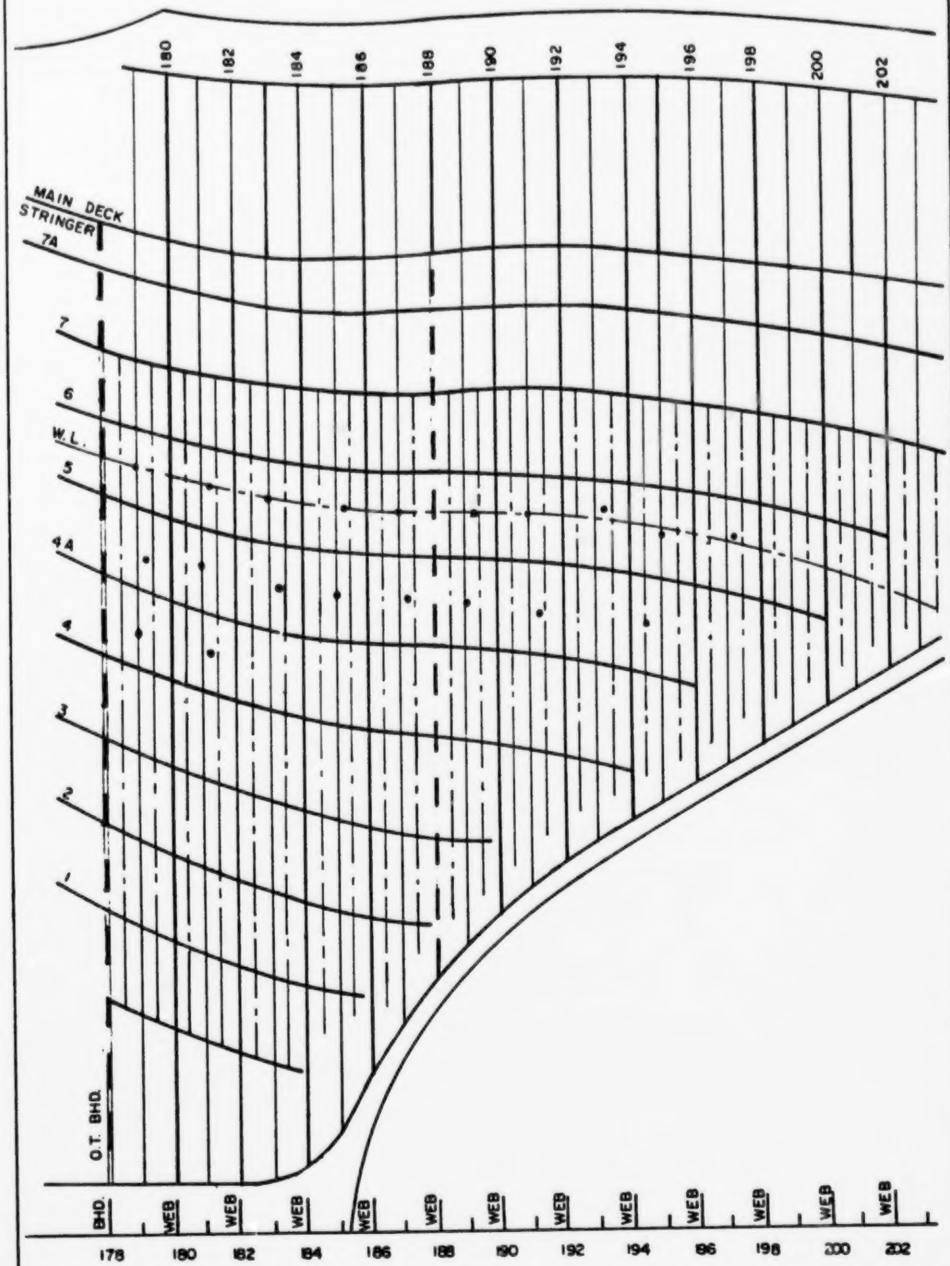

180
182
184
186
188
190
192
194
196
198
200
202
MAIN DECK
STRINGER
7A
7
6
W.L.
5
4A
4
3
2
1
O.T. BHD.
BHD.
WEB
178
180
182
184
186
188
190
192
194
196
198
200
202

FIG. 5 LOCATION OF STRAIN GAUGES FWD. - PORT SIDE

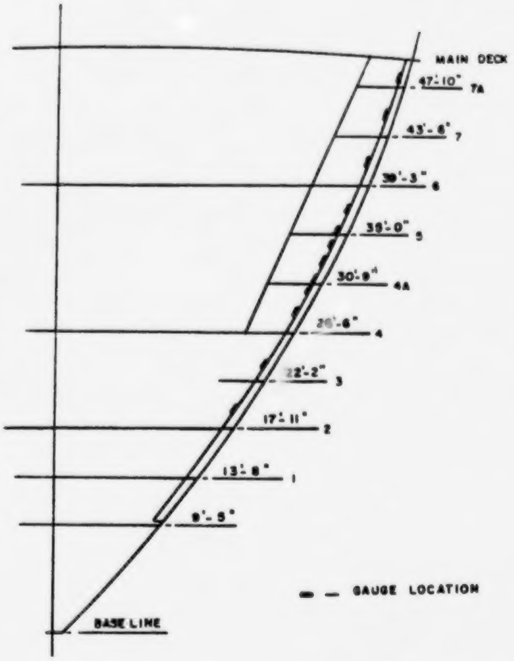

MAIN DECK
47'-10" 7A
43'-6" 7
39'-3" 6
35'-0" 5
30'-9" 4A
26'-6" 4
22'-2" 3
17'-11" 2
13'-8" 1
9'-5"
GAUGE LOCATION
BASE LINE

FIG. 6 MAIN FRAME 183

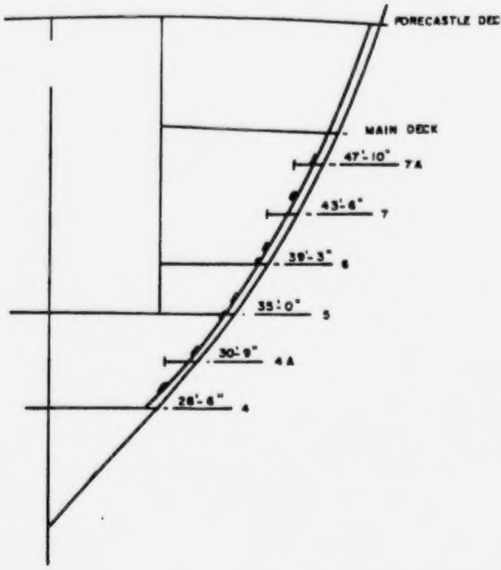

FORECASTLE DECK
MAIN DECK
47'-10" 7A
43'-6" 7
39'-3" 6
35'-0" 5
30'-9" 4A
26'-6" 4

FIG. 7 FRAMES 189, 191

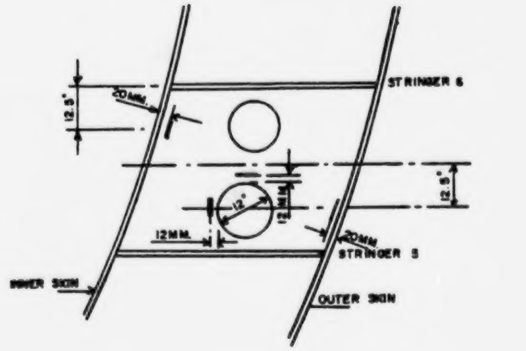

12.5"
20MM.
STRINGER 6
12.5"
12"
12MM.
12MM.
20MM
STRINGER 5
INNER SKIN
OUTER SKIN

FIG. 8 STRAIN GAUGES IN WEB FR. 184

NUMBER OF GAUGES: 4

(NOT TO SCALE)

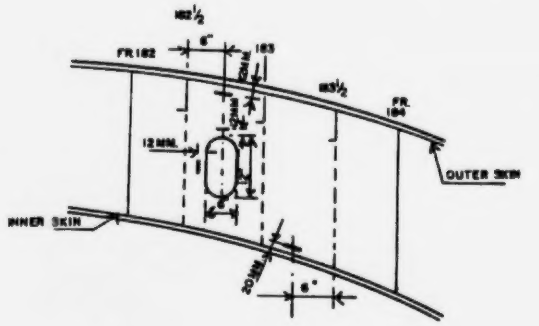

182½
FR 182
6"
183
20MM.
183½
FR. 184
12MM.
6"
OUTER SKIN
INNER SKIN
20MM.
6"

FIG. 9 STRAIN GAUGES IN STRINGER: #5

NUMBER OF GAUGES: 4

(NOT TO SCALE)

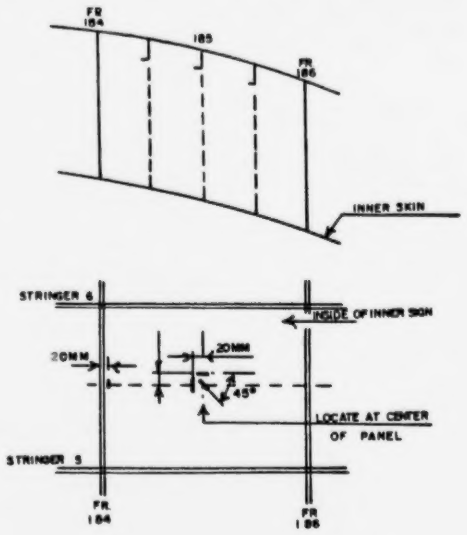


FIG. 10 STRAIN GAUGES INNER SKIN :
NUMBER OF GAUGES : 4

(NOT TO SCALE)

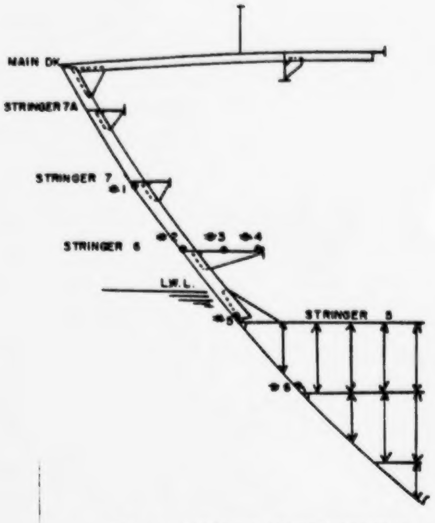


FIG. 11 LOCATION OF THERMISTORS AT FR. 193 STARBOARD SIDE

Forward gauges, located approximately amidships between frames 103A and 107A and stringers B and C, are fitted to the intermediate frames, and five on a panel of the outer shell. The primary purpose of these gauges is to record hull stresses caused by field pressure.

A port side gauge array comprising 20 gauges located on transverse frames and outer shell close to the water line was fitted forward between frames 179 and 196 (Figure 5). This array is adequate to pick up impacts and register local strains on the structure inside the array but is not intended for calculation of ice loads or detail structural analysis.

Determination of ice breaking loads from strain measurements requires establishment of relationships between strains in the hull structural members such as ordinary frames, web frames, and stringers and the applied loads at known locations. The calibrations to confirm these relationships were performed alongside in March 1978 shortly after the ship hull was floated out of the drydock and are discussed further in Section 10.

The temperature gradient through the hull structure above and below the water line is obtained through a series of thermistors mounted forward on the shell plating and along stringer number 6 (Figure 2).

PROPULSION SYSTEM SENSORS

Records of propulsion system parameters are made only where they relate directly to the performance of the ship. These parameters are listed in Table III.

The status of the ship's propulsion system components is monitored by standard marine equipment (RPM, thrust) or through pickups connected mechanically to machinery control linkages (propeller pitch, fuel rack). The torquemeter was custom designed and built.

The Renk thrustmeter provides a voltage output proportional to shaft thrust. The main gear box, also supplied by Renk was instrumented and calibrated during assembly by the manufacturer.

Signals proportional to propeller shaft torque are supplied by a torque meter designed and built by the system contractor. Such strain gauge arrays mounted on the shaft, sense the torque and their output is processed and transmitted to the non-rotating instrumentation through a telemetry system.

Pitch angle of the controllable pitch propeller is picked up from the LIPS oil distribution box fitted on the propeller shaft in the engine room. A follow-up potentiometer mechanically connected to the pitch response linkage puts out a signal proportional to the actual pitch angle of the blades. The pitch order lever in the pilot house is fitted with a similar device which provides a signal proportional to the pitch angle ordered.

The propeller blade spindle torque is not measured directly. It must be derived from measurement of the hydraulic pressure on the actuating system combined with the blade pitch position. A differential pressure transducer is fitted on the oil distribution box to measure the hydraulic pressure.

Shaft and engine RPM are recorded through taps connected directly to the RPM tachometers.

SHIP PERFORMANCE SENSORS

Measurement of the performance of the ship includes monitoring of the steering and propulsion commands issued from the bridge and the response of the ship and its equipment to these commands. Performance is monitored by a variety of devices, sensing operations directly, or from outputs taken from the ship's existing instrumentation. Ship performance sensors are listed on Table III.

Two packages made up of three accelerometers each, provide signals proportional to heave, surge and sway. These packages are mounted respectively in the fore peak space and in the engine room.

One of the ships two Sperry Mk 37 gyro compasses was fitted with a sine-cosine potentiometer at the time of manufacture. The sine and cosine signals are picked up on separate channels of the system. An algorithm incorporated in the playback software marries these channels, outputting ship's heading.

Ship speed is measured through a Sperry Doppler Speed Log, fitted as part of the Data Collection System. The output signal, is proportional to the ship's speed, is picked up at the log recorder on the bridge.

The steering stand on the bridge and the rudder stock are both fitted with follow-up potentiometers, providing signals proportional to the rudder angle ordered and the actual rudder angle achieved. A differential pressure transducer across the steering gear hydraulic cylinders provides information from which the rudder stock torque may be calculated utilizing rudder angle and hydraulic cylinder differential pressure as variables.

Ship pitch and roll angles are detected by an aircraft type vertical gyro mounted in the laboratory. Pitch and roll angles are directly proportional to gyro output and are printed out by the playback program in degrees utilizing a simple conversion constant.

Since the ship's draught is of considerable significance in studying the reaction of the hull strain gauges, and in assessing other aspects of ship performance, the draughts forward and aft are entered into the data collection system by position calibrated switches mounted in the pilot house console.

ENVIRONMENTAL CONDITIONS

The prevailing environmental conditions are of interest not only as they effect the other data gathered, but for long term accumulation of statistical information.

Since the environmental changes are relatively slow, a control panel is mounted on the bridge console through which the environmental information is entered manually. This is done through decade switches manually set to enter visibility in nautical miles, ice cover and cloud cover in tenths, air temperature in degrees Celsius, relative humidity in percentage, and barometric pressure in millibars.

Since wind speed and direction are subject to rapid variations, the outputs from these two instruments are tapped off directly from the anemometer and wind vane output for automatic recording.

AUXILIARY SYSTEMS SENSORS

Instrumentation has been provided to monitor the performance of the thruster/bubbler system on board the ship. Comparison of performance figures with and without the operation of this system should provide a measure for the evaluation of the bubbler system.

Measurement of the air pressure at the compressors is made utilizing transducers installed in the primary manifolds, and indication of the control valve settings is accomplished by direct interfaces with the associated mimic displays. There is provision for two extra pressure measurements within

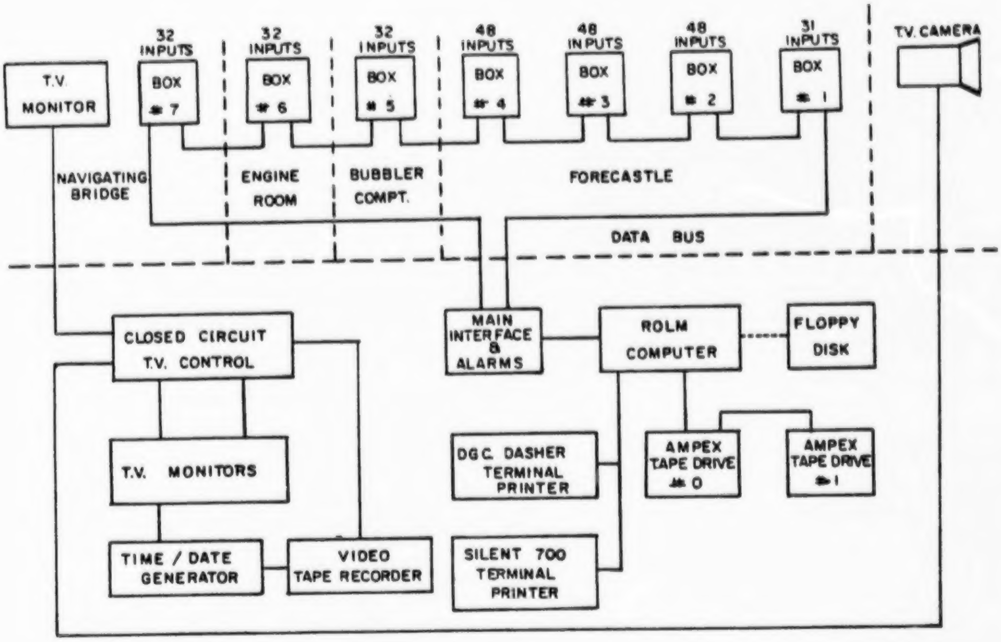

32 INPUTS
32 INPUTS
32 INPUTS
48 INPUTS
48 INPUTS
48 INPUTS
31 INPUTS
T.V. CAMERA
T.V. MONITOR
BOX # 7
BOX # 6
BOX # 5
BOX # 4
BOX # 3
BOX # 2
BOX # 1
NAVIGATING BRIDGE
ENGINE ROOM
BUBBLER COMPT.
FORECASTLE
DATA BUS
CLOSED CIRCUIT T.V. CONTROL
MAIN INTERFACE & ALARMS
ROLM COMPUTER
FLOPPY DISK
T.V. MONITORS
DGC DASHER TERMINAL PRINTER
AMPEX TAPE DRIVE # 0
AMPEX TAPE DRIVE # 1
TIME / DATE GENERATOR
VIDEO TAPE RECORDER
SILENT 700 TERMINAL PRINTER

FIG. 12 BLOCK DIAGRAM OF DATA COLLECTION SYSTEM

the air distribution system if they should be found necessary.

SENSOR DATA PROCESSING

The Data Collection System is shown schematically in a block diagram (Figure 12). The data gathering operation is controlled by a ROLM 1603A mil-spec mini computer capable of working in uncontrolled environments between temperatures of $0^{\circ}C$ and $65^{\circ}C$. The configuration of the system permits the use of 256 data channels, with a capability of expansion to 512 sensors. Advantage has been taken of the speed of the computer to use time-domain multiplexing, in which sensors are interrogated in a pre-determined order by operator input to the computer program. The sensor analog output is amplified, filtered and transmitted to an interface where the signal is digitized through an A/D converter and fed to the computer for storage on magnetic tape.

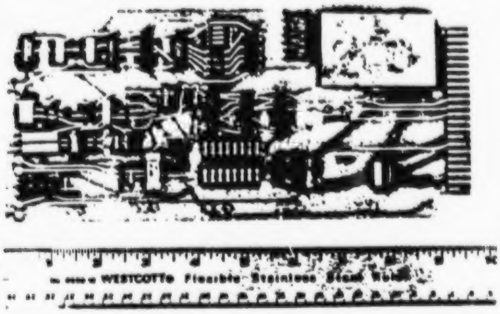
Seven junction boxes (Figure 13) are situated at different key locations to which the sensor outputs are fed. The sensor output signal is conditioned through a corresponding channel amplifier card. Each channel amplifier is designated a unique code or "address" which responds to a specific signal from the computer. A digital, high-level, parallel addressing system has been used to select the individual channels, and eight of the data bus lines are used to carry the "address" coded in binary form.

Eight lines permit a total of 256 unique codes to be handled. A ninth line is available to permit future expansion of the system.

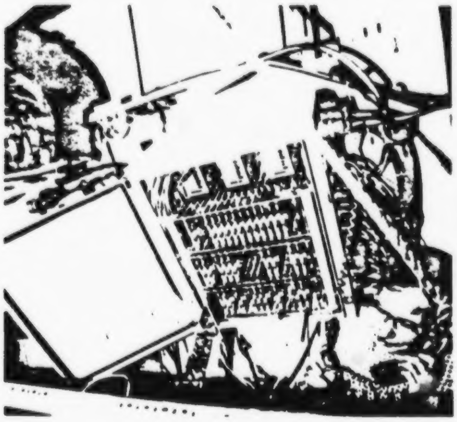
Sensor outputs are amplified by individual circuit cards and, at any instant, only one output is on the return line to the laboratory.

This specific output results from the unique address placed on the data bus by the computer in response to channel selection by the operator or program. Change of address results in the selection of a different sensor and a corresponding change in output signal.

The sequential signals transmitted through the data bus are in digital form for the address but in analog form for the data output. Before the output signal can be accepted by the computer, it must be converted to digital form. This is accomplished by an analog to digital converter at the interface. The choice of digitizing at the computer rather than at the junction boxes was



a) CHANNEL AMPLIFIER CARD



b) SYSTEM JUNCTION BOX

Figure 13 - SYSTEM ELECTRONIC MODULES

dictated by economic considerations and the technical requirement for high speed sampling rates.

The interface actually performs several functions, as follows:

i) Amplification of low power "address" signals from the computer by driver circuits to full bus power level.
ii) Analog to digital conversion of data output signals.
iii) Alarm level setting of strain gauge data channels.
iv) "Fail safe" completion of timing in event of a conversion failure.

The data bus is a twisted pair armoured cable which connects the junction boxes to each other and to the main interface in the laboratory. It runs down both sides of the ship and forms a loop, thus affording some protection against data loss due to cable damage.

The Computer System itself consists of:

- a ROLM 1603A mil-spec general purpose mini computer for system control;
- a DGC dasher terminal for operator communications;
- two AMPEX high density magnetic tape transport systems for data storage;
- two AED floppy disk drive systems for software development.

Each of the components of the system and the parameters monitored by each junction box are clearly indicated in Figure 3.

CLOSED CIRCUIT TELEVISION SYSTEM

A CCTV System is included as an adjunct to the data gathering system. Its functions are:

a) to provide a visual record of the ice interaction with hull, which can later be correlated to the strain gauge readings;
b) to provide general visual information concerning the environmental conditions, such as visibility, and ice and snow coverage;
c) to automatically provide a 180° pan of the ship surroundings when triggered by the computer.

A video monitor is provided on the bridge for use of the ship's navigating personnel. The two main video monitors location in the laboratory, are provided to enable review of video tape without interference of the monitor projecting images direct from the camera.

The camera is normally mounted on top of the lookout at the forward masthead. In this position it is remotely controlled, either manually or automatically. Alternate mounts are also provided, two on the forecastle, starboard side, and one at the stern on the poopdeck. These three locations have no provision for remote control.

A video recorder is provided, on which the display may be recorded at any time. In the automatic mode, the system is activated by computer command related to the alarm level. Time/Date information appears on every frame to permit correlation of video and data tape records.

DATA COLLECTION PROCESS AND OPTIONS

The data acquisition system has been designed for automatic operation and to be run by personnel with a minimum of training. It is designed to:

a) collect sensor data and store it on tape;

b) permit limited viewing and analysis of the data via hardcopy printout while it is being collected.

The applications software comprises two basic programs, i.e. an acquisition program and a playback program.

The operator is free to select the sampling pattern to suit any particular requirement. For example, as in monitoring, he may be interested in one channel only, while in the case of actual ice trials he may wish to record all available data. He may also select the rate at which any channel is sampled and the mode of sampling.

Once data gathering is started, the sampling of sensors is continuous. However, the recording of data to tape is optional.

Pre-sampling plan comprises:

Pattern - Any sensor or combination of sensors

Rate - Seven sampling rates are available provided the total number of samples/second does not exceed 1765. Available rates may be applied to any sensor, bearing in mind the total rate limitation, as follows:

Rate 1 - 1 sample/10 seconds
" 2 - 1 sample/second
" 3 - 10 samples/second
" 4 - 50 samples/second
" 5 - 100 samples/second
" 6 - 500 samples/second
" 7 - 1000 samples/second

Mode - Samples of the instantaneous values may be taken (real). Since it is possible in this mode to miss a peak, a second mode alternative using a peak holding circuits is available.

Alarm- The operator can preset high and low values which when exceeded will be recognized by the computer and will activate recording.

The operator also has a choice of setting the system to operate in either continuous recording or standby mode of operation.

If continuous recording mode is selected, all data collected is written to tape. This may be useful for calibration and testing, but in general will record masses of uninteresting data. If the standby option has been selected any or all sensors may be assigned "alarm limits" to distinguish interesting values from uninteresting ones. As long as no sensor exceeds its alarm limits, no data is recorded on tape, although the sensors are sampled continuously. When any sensor exceeds its alarm limit, recording is started and continues for a preselected interval (30 seconds, for example) after which the program reverts again to standby, sampling but not recording. In standby mode, one second's worth of data is recorded to tape every hour, to provide static load and other information.

Until the operator halts data gathering, the sampling and recording of data takes precedence over other functions. Nevertheless, it is possible to verify operation of the system via two printout options which operate concurrently with data gathering:

a) Monitoring

Any sensor may be selected for continuous printout and a value is typed periodically at a rate dependent on printer speed limitations. This is useful for checking a sensor which may be expected to vary over a period of seconds. It is not capable of reflecting changes occurring at faster rates due to printer speed limitations.

b) Logging

In the absence of monitoring, logging printout is automatically produced. One value for every sensor is typed at an interval selected by the operator (every 2 hours, for example). This is usefull as a permanent record that the system is working, and also as a check on the proper functioning of sensors. All values exceeding their alarm limits are flagged on the printout and a careful check should be made of readings on sensors that are not alarmed to ensure that they are reasonable.

The playback program provides a limited capability for reviewing recorded data onboard. The tape may be searched by alarm limits, or by date and time, to locate an area of interest. When this is located, the operator may proceed in one of three modes:

a) Monitoring mode prints all values or every Nth value (N selected by the operator) of one selected sensor.

b) Dump mode prints every value recorded. This mode will be used only for debugging and system verification.

Statistics are also accumulated.

c) Statistics mode: no printout occurs as the tape is read. Statistics are accumulated.

Although limited statistical data can be provided under (a) onboard, detailed analysis of accumulated data must be carried out ashore on a mainframe computer.

SOFTWARE

Since the early concept of the data collection system dictated the requirement for computer control, the software considerations were of paramount importance.

It was decided that the acquisition of data and the onboard analysis of that data should be treated as two separate processes. This permitted the use of a small mini computer having a limited memory, and a more flexible programming format.

Thus, the system has been developed to make use of two software packages aboard the ship. Both programs are stored on magnetic tape and either one can readily be loaded into the computer, depending on the function required.

DATA ACQUISITION PROGRAM

The Data Acquisition Program directs the routines of addressing the sensors, recognizing the prescribed alarm levels and initiating the actions demanded, controlling the tape drives and storing digital data representative of sensor output values on the tape. To make a printed record of the data during the collection process the computer takes the individual sensor values, converts them to SI units through calculations using individual conversion formulae, and transmits this data for printout at the terminal. All of these tasks are carried out automatically, in accordance with the sampling plan chosen by the operator.

An overview of the Data Acquisition Program is shown in Figure 14. A user clock routine is used to handle the various features of the program. A stack of pointers controls sampling. After the sampling pattern is selected, the channel addresses are sorted into rate tables. At appropriate time intervals, the user clock interrupt service routine places pointers to these rate tables onto a LIFO stack. All sensors in the first table are sampled before the table pointer is popped off the stack and the new rate table used. New pointers may be added to the stack at intervals.

PLAYBACK PROGRAM

The playback program was designed to perform on-board limited statistical analysis and impact counts on the recorded data. An overview of the playback program is shown in Figure 15. As the structural strength of the ship is a prime area of investigation, the analytic tools are designed to extract important statistical information from the strain gauges. This program provides a statistical analysis, printing out the mean, maximum and minimum recorded values, alarm limits, percentage of recorded values outside these alarm limited and the standard deviation for each sensor and can be undertaken at the ship for the benefit of onboard personnel.

Two additional analyses programs have been written for main-frame computer use. One of these, a Point Histogram program can be readily adapted to onboard use. This program provides a histogram of recorded data using operator selected boundaries. As the hull structure and/or the strain gauge itself may have some residual strain (non-zero mean), the data sequence is high-pass filtered to remove any offset. The histogram produced provides a rough indication of the probability density function of strain values encountered at that particular location of the hull structure.

Due to the enormous quantity of data recorded over a season, the software has been designed to conduct data analyses of a very preliminary nature. After the bulk of the data has been sifted through, second generation programs designed specifically for significant portions of data will be developed employing further refinements to the technique, including a finite element analysis of the strain gauge array.

SYSTEM TESTS AND CALIBRATION

On integration of all the system hardware and software modules, numerous tests were conducted to verify that it functioned according to the design specifications. An evaluation of the overall performance was also conducted. Tests verified that the system could handle an information rate of up to 1765 samples/second.

In order to calibrate each sensor, it was necessary to obtain a plot of voltage output versus range of activity of each sensor. Where the full range of operation could be simulated, this was a straight-forward process, where it could not, such as torque, thrust, ship's speed etc., time consuming tests were required under actual operating conditions.

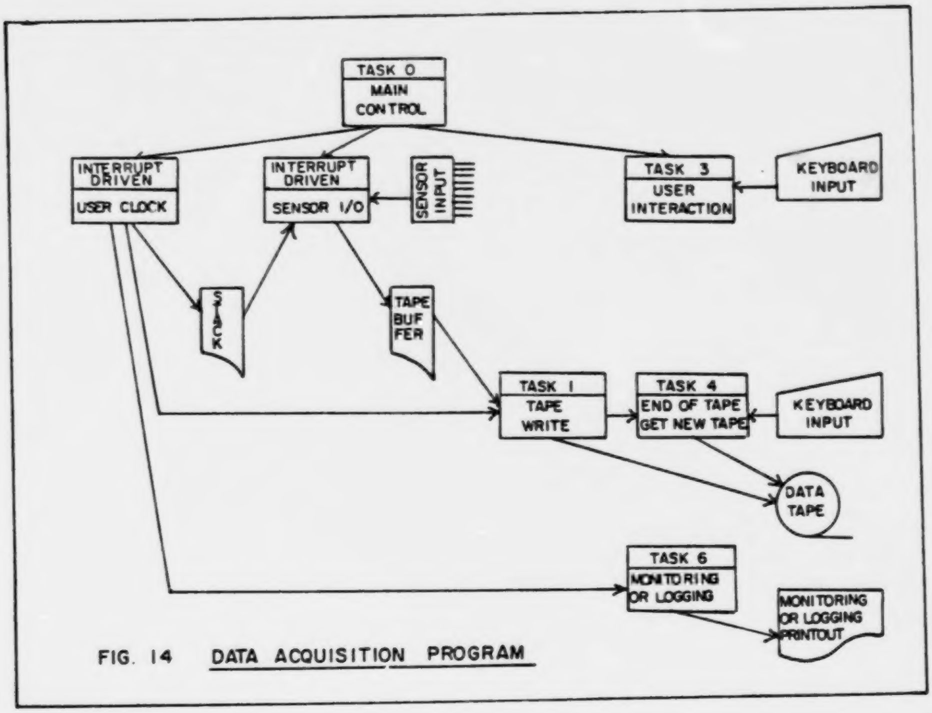

TASK 0
MAIN CONTROL
INTERRUPT DRIVEN
USER CLOCK
INTERRUPT DRIVEN
SENSOR I/O
SENSOR INPUT
TASK 3
USER INTERACTION
KEYBOARD INPUT
STACK
TAPE BUFFER
TASK 1
TAPE WRITE
TASK 4
END OF TAPE GET NEW TAPE
KEYBOARD INPUT
DATA TAPE
TASK 6
MONITORING OR LOGGING
MONITORING OR LOGGING PRINTOUT

FIG. 14 DATA ACQUISITION PROGRAM

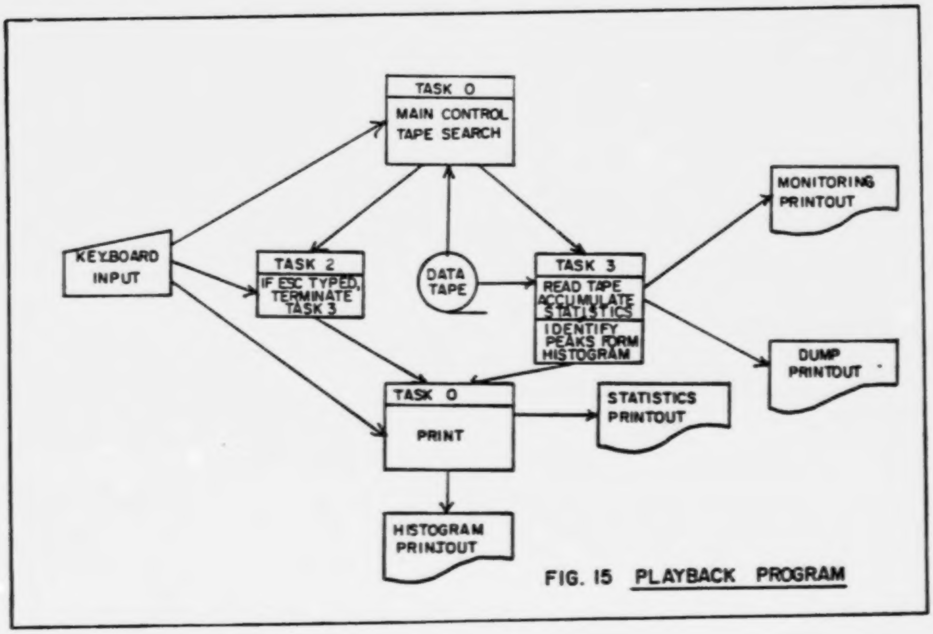

TASK 0
MAIN CONTROL
TAPE SEARCH
MONITORING PRINTOUT
KEYBOARD INPUT
TASK 2
IF ESC TYPED, TERMINATE TASK 3
DATA TAPE
TASK 3
READ TAPE ACCUMULATE STATISTICS
IDENTIFY PEAKS FORM HISTOGRAM
DUMP PRINTOUT
TASK 0
PRINT
STATISTICS PRINTOUT
HISTOGRAM PRINTOUT

FIG. 15 PLAYBACK PROGRAM

Having compiled voltage plots, formulae were developed for entry into the computer program so that calculation and conversions could be processed to provide outputs of both the acquisition and the playback programs in SI units. Figure 16 is a typical printout of the statistical data provided by the playback program from a recorded tape.

Special comments are warranted however on the calibration of the strain gauge arrays.

It was not the intent of the data collection system to measure the actual strains resident in the ship structure. It is intended to demonstrate the location and magnitude of ice impacts, and to provide a count of same. Therefore, a static calibration of individual strain gauges was not undertaken.

Each strain gauge is temperature compensated and calibrated by the manufacturer with gauge factor being provided.

The amplifier for each gauge can be electrically zeroed and has a limited adjustable gain. In addition, an automatic auto-zero facility compensates for small amplifier drifts. In all a total of seven different gauge factors have now been encountered, resulting in seven different conversion formulae being stored in the computer for conversion of strain gauge outputs to micro strains.

Since ice impacts are random, most will affect more than one gauge in adjacent structures. Relatively few impacts can be expected to centre directly over a gauge. Hence, to compute the applied load, the whole of the structural panel strain pattern must be measured and the load required to create this pattern must be calculated.

To provide a means for the calculation of applied ice loads, the starboard bow of the vessel was calibrated physically using a jacking beam, each end of which was bolted to legs welded to the outside of the shell at stringer locations as in Figure 16 and 17. A hydraulic jack in the central portion of the beam was activated to provide a known external load at a known point on the shell. With a series of attachment legs and a moveable hydraulic jack, loads could then be applied at a number of locations.

The location of points where loads were applied is shown in Figure 18. The following conclusions from the calibration tests were reached:

a) because of the very stiff nature of the structure, a load of 25 tonnes was required to cause significant strains at gauges away from the load point;

b) better consistency was noted in the loading steps within the range of 25 to 53 tonnes;

c) the maximum frames strain recorded was about 300µS for a load of 50 tonnes;

d) maximum strains obtained from the tests, were found to agree with the values estimated from the preliminary finite element analysis.

OPERATIONAL EXPERIENCE

The year of 1979 was the first season during which the system was fully operational as a data gathering medium. The M.V. ARCTIC made three voyages into Nanisivik and one into Churchill, between July and November, with a full time operator in attendance. During this period a total of 39 magnetic tape reels of data were recorded. Figure 19 illustrates the general route taken into the Nanisivik Mine site.

As would be expected, a wide variety of ice conditions were encountered from six feet of multi year ice on the first trip into Nanisivik, to nilas on the last.

Most of the data recording took place in Strathcona Sound, Admiralty Inlet, Lancaster Sound and in Hudson Bay. Occasionally, data was also recorded in Baffin Bay when bergy water was encountered. In most of the passages in ice, a Canadian Coast Guard Icebreaker was in attendance, with the M.V. ARCTIC following in a path of broken ice.

The ice was heaviest in July, when thicknesses of up to 1.8 metres with 10/10 cover and some multi year content were encountered. As the season progressed ice conditions became less severe, and in October the coverage was 10/10, 23 cm thick and with some multi year content.

In Hudson Bay in November ice up to 30 cm thick with 10/10 cover and some multi year content was traversed. The data collected on this voyage is of interest as no icebreaker was in attendance, and the M.V. ARCTIC broke its own channel.

Having the unattended mode recording feature made it possible for one operator to manage the complete system operation during passages through ice, enabling him to spend much time on the bridge logging the environmental conditions with only periodic visits to the

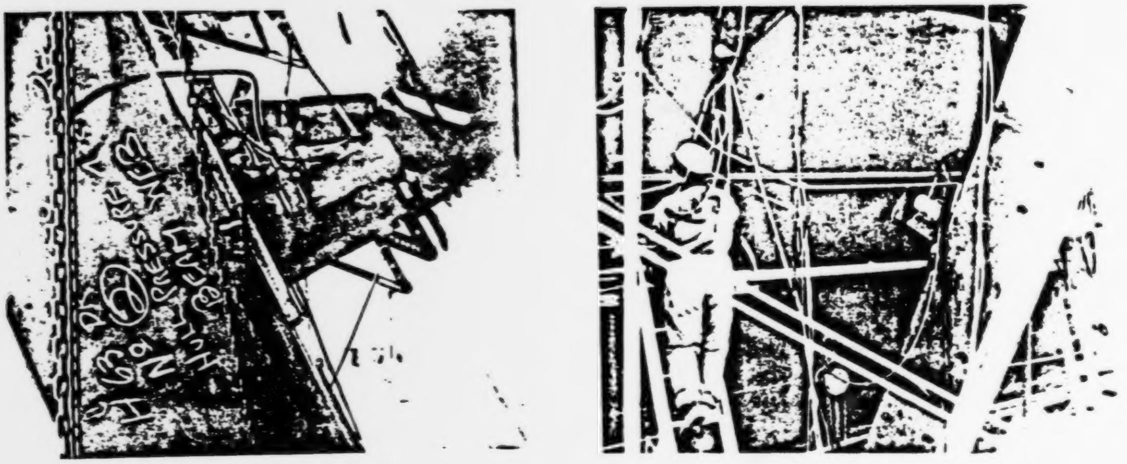


Figure 16

Figure 17

Ice Load Calibration Test of Hull using Jacking Beam

laboratory to change tapes.

Due to the severe conditions imposed by the salt water environment the attrition rate of the strain gauges was observed to be abnormally high. This may be due to failure of the protective vinyl cable leading to the gauges. It is believed that moisture enters the cable either through leaching of the polymers causing brittleness and cracking, or by holes formed in the vinyl during extrusion. Some alternate possibilities that may be tested for future use include polyurethane sheathed cables, and an additional sheath applied to the cable after the regular assembly stage.

The analog signal output from each channel amplifier is transmitted long distances along the data bus. In particular, sensor output signals from the fore peak must traverse signal paths in excess of 150 metres, making them susceptible to distortion, due to the finite bandwidth of the data bus. In addition noise in the system causes some deterioration in the signal to noise ratio. Digitizing of the signals at the junction box itself on the other hand may circumvent this shortcoming and provide the advantage of relative noise immunity of a digital transmission. If current state-of-the-art digital transmission techniques are applied, no compromise of the system's high information handling rate will be required.

The storage memory capacity of the computer is 32K words. While this amount is sufficient for the data handling functions of the Data Acquisition Program, the more complex processing features of the Playback Program require additional storage space. An expansion of memory capacity would enable the use of a more versatile Playback Program. This could give the operator more immediate information on the nature of data recorded, instead of awaiting the results of analysis ashore.

The CCTV System has proved to be useful both as a permanent record of environmental conditions, and to navigating officers in conditions of poor visibility. It was found that due to its location, it was subjected to adverse weather conditions including heavy bow spray during storms. Special care was taken therefore to ensure that the T.V. camera enclosure could withstand extremes in weather conditions in a salt water environment.

Since the M.V. ARCTIC is a commercial cargo ship one of the drawbacks encountered is that the research aspect of the data collection system is of secondary importance and cannot be allowed to take precedence over the ship's normal commercial activities. Thus, over much of the year, the ship does not operate in the Arctic and even when doing so the navigating officers attempt where possible to avoid encounters with ice. Only during dedicated ice trials can conditions for the gathering of performance in ice and ice effects data be controlled.

An opportunity was presented in January of 1980 to conduct such dedicated ice trials in the Saguenay River region of Baie des Ha Ha. Over a period of two days it was possible to make a number of trial resistance runs and partial turning circles in 30 to 46 cm of fast new ice and clogged channel conditions. Eight tapes of data were recorded during these trials, backed up by observed and measured data on the ice characteristics.

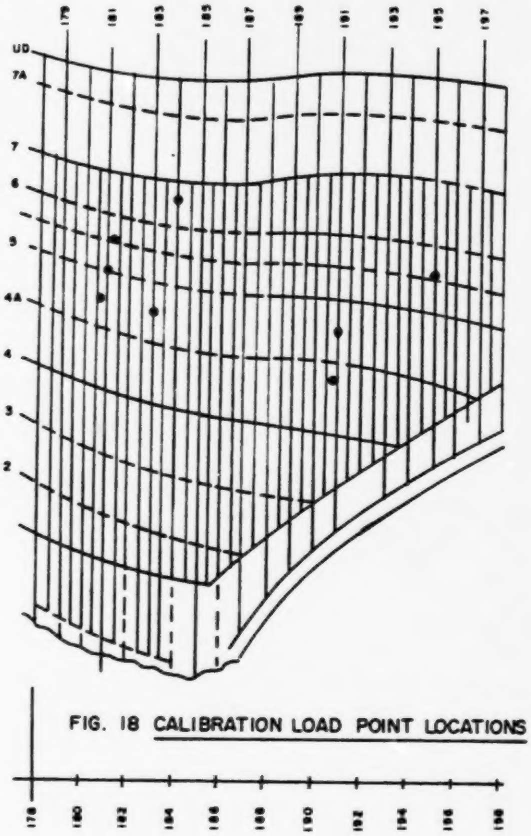


FIG. 18 CALIBRATION LOAD POINT LOCATIONS

These trials became possible at the last minute because of a change in the ship's commercial schedule. With only three days notice the organization and program for these trials was accomplished including assembly of ice testing specialists and equipment. This was only possible because of the data collection system already installed, with its extensive sampling and recording features.

CONCLUSION

Analysis and evaluation of the data gathered by the Data Acquisition System are currently underway. As this work continues, procedures in the operation of the system are being refined to ensure that the recorded data is both meaningful and reliable. Future use of the system, and results obtained, should prove of interest to all concerned with northern navigation.

Currently there are 41 spare channels in the system. These can be utilized to monitor and record other areas of interest which could benefit from rapid, long term surveillance and statistical analysis. The system can be readily adapted to record additional data, and separate out specific items as desired, or to carry out dedicated monitoring of a series of sensors.

Much interest has been shown in an adaptation proposed by German & Milne Inc. of the system to provide a Navigational Air Warning feature. This feature would provide a warning to the ship's officers when ice loads on the hull exceed safe (preset) limits. Such a device is adaptable to any vessel exposed to ice or hydrodynamic (slamming) forces.

In all, the Data Aquisition System has demonstrated its capability as an effective tool for the evaluation of the performance of an icebreaking cargo ship. It also possesses inherent flexibility to perform functions not originally envisaged and is producing an effective data base for research on future northern navigation.

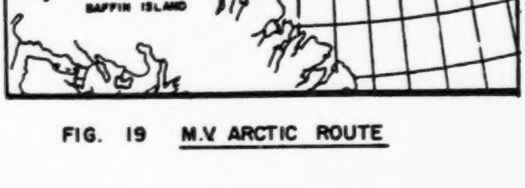


FIG. 19 M.V ARCTIC ROUTE

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APPENDIX 'C'

Indexes of
'System Operation & User's Manual'
Volumes 1, 2 and 3

SYSTEM OPERATION AND USER'S MANUAL

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PART I: GENERAL DESCRIPTION OF INSTRUMENTATION AND DATA COLLECTION SYSTEM

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Section 3: Data Collection System

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Section 2: System Operation

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Section 4: Playback

Section 5: Test Modes

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- Section 6: Subjunction Boxes and Data Bus
- Section 7: Interface
- Section 8: Computer System

PART III: CLOSED CIRCUIT T.V. SYSTEM

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APPENDIX 'D'

Format of Data Tapes

Header Block Format

A header block is of fixed length, containing 1546 words of 16 bits each. A header block occurs at the beginning of every file. The conditions which cause one file to be ended and a new one begun are:

1) End of tape - when one tape is full of data, recording on a new tape begins with a header block.

2) When the operator halts data gathering, the current file is ended. When data gathering is resumed, the new file begins with a header block.

Word	Contents	
1	Year	Date & Time (6 words)
2	Month	
3	Day	
4	Hour	
5	Minute	
6	Second	
7	Logging interval (in minutes)	
8	Recording mode (-1 for recording; 0 for standby)	
9	Number of sensors (256 or 512)	
10	- spare -	
11-522	Rate and mode table (512 words)	
	Bits	Contents (value)
	(msb) 0-2	Unused (0)
	3-5	Rate (0-7)
	6	Mode (0=P, 1=R)
	7-15 (lsb)	Address (1-255)
523-1034	Alarm limit table - minimums (512 words)	
1035-1546	Alarm limit table - maximums (512 words)	

Header Block (Cont'd)

Word	Contents	
1	Year	start date & time 6 words
2	Month	
3	Day	
4	Hour	
5	Minute	
6	Second	
7	Logging interval	
8	Recording mode	
9	Number of sensors (256 or 512)	
10	- spare -	
11	default rate, default mode, adr 0	Sampling pattern table 512 words
	rate$_1$, mode$_1$, adr 1	
	rate$_2$, mode$_2$, adr 2	
	:	
	.	
	rate$_{255}$, mode$_{255}$, adr 255	
	space for adr 256	
	:	
	.	
522	Space for adr 511	
523	default min	Minimum alarm limit table 512 words
	min$_1$	
	min$_2$	
	:	
	.	
	min$_{255}$	
	min$_{256}$	
	:	
	.	
1034	Space for min$_{511}$	

Header Block (Cont'd)

Word	Contents	
1035	default max	Maximum alarm limit table 512 words
	max$_1$	
	max$_2$	
	:	
	.	
	max$_{255}$	
	Space for max 256	
	:	
	.	
1546	Space for max 511	

Data Block Format

When the system is recording, two data blocks are recorded each second. A data block is of variable length, from a minimum of 10 words, to a maximum of 4096 words. The first eight words specify the date and time of the record, the recording mode, and whether this is the first or second record of the pair for the second. The following words are data records, grouped in pairs. The first word in each pair specifies the address of the sensor sampled (1 to 255). The second word is the reading obtained from the sensor (0 to 1023).

Word		
1-6	Date and time (same as header)	
7	Block type	
	-1 Continuous recording	
	n Standby triggered into recording (n more blocks will be recorded) N is decremented in successive records.	
	1 Standby logging (once per hour two successive records with 1 in this field are written)	
8	Index number	
9	Sensor address (1-255)	Data record
10	Reading (0-1023; 0= -10V, 1023= +10V	
11-12	Data Record	
:	:	

DATA BLOCK

Word		
1	Year	date & time of this record 6 words
2	Month	
3	Day	
4	Hour	
5	Minute	
6	Second	
7	Block type (continuous, standby, logging)	
8	Index (1st or 2nd record for this send)	
9	Adr$_1$	data record 2 words
10	Data reading$_1$	
11	Adr$_2$	data record 2 words
12	Data reading$_2$	
	: .	
8+2n-1	Adr$_n$	data record 2 words
8+2n	Data reading$_n$	

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